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An Address

ON

INSULIN AND THE MORTALITY RATE FROM DIABETES MELLITUS*

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IT is my purpose this evening to attempt to evaluate insulin, with particular reference to its influence upon the mortality rate from diabetes. In order to do so, I propose to bring before you the experience we have had with diabetes at the Montreal General Hospital. Though the greater part of my remarks will be confined to our own experience, it will not be because I do not recognize the probability of other clinics having met with similar conditions. I realize that a consensus of experience would be a more reliable source from which to draw conclusions, but there are valid reasons for confining my investigations to the limits mentioned.

Firstly, I intend to compare data from year to year. In order to compare one thing with another, both things must be comparable. This is an elementary principle of statistics. Since in no two clinics is the treatment of diabetes exactly alike, one would, by making use of the experiences of other clinics, introduce variables, the influences of which would be rather difficult, or I should say, almost impossible to measure.

The second, and equally important, reason is that we know the different periods of time for which the great majority of these patients have been under fairly constant observation. Having been under observation, we should have a fair idea as to whether they have or have not followed treatment. This is a most important factor to consider in the interpretation of results.

Since the method of investigation was essentially statistical, it was necessary to make reasonably certain that the requirements of such an investigation were met. This, I believe, we have done. Firstly, we have a fairly representative sample of diabetics, both as to age and sex. Secondly, the sample appears to be adequate in that it is large enough in point of numbers to satisfy the requirements of the theory of probabilities. This is shown in the following table (Table I). From January,

TABLE I.

Ages of all Patients on Admission to the Clinic for Diabetes in The Montreal General Hospital (1921 to 1927)

Age	*No.*	*Age*	*No.*	*Age*	*No.*	*Age*	*No.*
1	1	22	8	43	46	64	11
2	3	23	6	44	42	65	14
3	3	24	6	45	28	66	17
4	1	25	9	46	28	67	5
5	5	26	15	47	34	68	10
6	9	27	11	48	32	69	8
7	3	28	6	49	30	70	11
8	2	29	14	50	48	71	1
9	3	30	12	51	28	72	8
10	5	31	18	52	57	73	1
11	8	32	15	53	23	74	6
12	4	33	22	54	36	75	3
13	4	34	31	55	34	76	1
14	5	35	25	56	18	77	–
15	7	36	20	57	25	78	3
16	11	37	26	58	38	78	1
17	8	38	33	59	26	80	1
18	7	39	33	60	30	81	2
19	13	40	50	61	13	82	–
20	7	41	38	62	25	83	–
21	7	42	35	63	22	84	1

* Read before the Montreal Medico-Chirurgical Society, November 4, 1927.

1921, to September 4, 1927, there have been 1,316 admissions to our clinic, including indoor and outdoor cases, and practically all ages are represented. Here are shown the ages of all patients as on the different dates of their admissions to the clinic and their incidences.

It will be seen that there were thirty-five diabetics of ten years of age or under; the numbers representing the second, third, fourth, fifth, sixth, seventh and eighth decades were 74, 94, 273, 361, 315, 136 and 25 respectively. We have had only three diabetics past the age of eighty years; two were eighty-one years old and the other was eighty-four.

Some idea of the number of patients we have had under fairly constant observation may be gained from a study of Table II. In spite of the fact that a number of our patients do not reside in Montreal, and that, diabetes being a chronic ailment, many patients tend to "make the rounds" at different clinics and disappear for varying periods of time, or permanently, it will be seen that the number of patients under fairly constant observation represents a very large percentage of those who came to the hospital.

In the first column are shown the total annual admissions to the clinic. These are then sub-divided into two groups of patients, namely, (a), those who reside in Montreal and (b), those who do not. This division is necessary since patients who do not reside in Montreal must be excluded from this study. Once patients leave the city and are not under reasonably constant observation, it would be a statistical error to assume that one knows whether they have or have not followed treatment.

An explanation of the data given under "corrected populations", (Column 8) is here necessary. With additional admissions to the clinic from year to year the total population of the clinic must increase. It is obvious, however, that the total number of diabetics at the end of any given year is not the sum total of admissions of the previous year, because of the deaths which had occurred during this year. The "corrected populations" allow for these deaths.

We are now confronted with another difficulty. During each year we were certain of a number of deaths which occurred. On the other hand, there were a number of patients who were neither seen nor heard of after having left the clinic. In spite of consulting the physicians who sent the patients to the clinic and other means of investigation, these patients could not be traced. It is quite probable, therefore, that many of them are dead. In order to be conservative in our estimates, we shall assume that all those missing are dead. We, therefore, have two types of mortality rates. A *known* death rate and an *assumed* death rate. This has made necessary the calculation of two different types of populations, a "known" and an "assumed" population. In Column 8, all patients not seen or heard of during the year are assumed to be alive and in Column 9 all such patients are assumed to be dead. The details of the method of calculating population is seen in Table III.

Returning to Table II, it will be seen that over 87 per cent of all our patients reside in Montreal, and a very large majority have been under fairly constant observation.

TABLE II.

CRUDE DEATH RATES FROM DIABETES MELLITUS IN THE CLINIC FOR DIABETES AT THE MONTREAL GENERAL HOSPITAL

	Annual admissions					*Montreal patients*				*Death rate per cent*	
		—Montreal—		*—Other—*							
Year	*Total*	*Number*	*Per cent of total*	*Number*	*Per cent of total*	*Deaths*	*Not seen nor heard of*	*Corrected populations*	*Corrected populations*	*Known*	*Assumed*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1921	84	78	92.8	6	7.2	9	3	78	78	11.6	15.4
1922	124	110	89.5	14	10.5	16	5	179	176	8.9	11.8
1923	206	181	87.8	25	12.2	11	6	344	336	3.2	5.1
1924	184	156	84.7	18	15.3	5	16	489	475	1.0	4.4
1925	220	191	86.6	29	13.2	7	18	675	645	1.0	3.9
1926	296	265	89.8	31	10.2	8	11	933	885	0.85	2.1
1927*	202	175	84.1	27	15.9	11	12	1100	1041	1.0	2.2

* To Sept. 4, 1927.

Column 8 "corrected populations" assuming all patients not seen nor heard of to be alive.

Column 9 "corrected populations" assuming all patients not seen nor heard of to be dead.

TABLE III.

Method for Calculating Annual Populations	
Patients residing in Montreal in 1921	78
Deaths amongst Montreal patients in 1921.... 9	
Missing amongst Montreal patients at the end of 1921 3	
Therefore total assumed to be dead	12
Total number of Montreal patients assumed to be alive at the end of 1921	66
Total number of Montreal patients admitted in 1922	110
Therefore total number of Montreal patients at end of 1922	176

Significance of Mortality Rates

Before discussing the mortality rates shown in the last two columns, may I briefly digress on the subject of mortality rates in general. It is a recognized fact that the best indication of efficiency of any particular treatment of any particular disease, is the effect of that treatment upon the mortality rate of that disease. If it can be shown that the mortality rate of a given disease can be lowered by a given treatment, and if that treatment is given and the mortality rate does not appear to have been lowered, there are three possible explanations. The mortality rate may be more apparent than real; that is, there may be other variables which have not been taken into account in the interpretation of the data. If, however, evidence is found to the contrary; that is, if the mortality rates are real, there are only two possible explanations left. Either the treatment has not been applied, or, if it has been applied, it has not been done so properly. It will, presently, be seen that these generalizations have a particular bearing upon the subject under discussion.

It will be seen from this Table II, Column 10, that the known death rate from diabetes in our clinic which was 11.5 per cent in 1921, that is, before the days of insulin, fell to 1.1 per cent in 1927. In the last column of this table are recorded the *assumed* death rates. For example, though we were certain of 9 deaths in 1921 we have assumed that there were 12 deaths in our clinic during that year, since 3 patients were not seen nor heard of. In spite of this assumption we find a parallelism between the *known* and *assumed* rates. Thus, though the assumed death rate was 15.4 per cent in 1921, that is, before the days of insulin, it was only 2.0 per cent this year. Insulin, therefore, appears to have decreased the death rate from diabetes in our clinic.

Crude and Corrected Death Rates

The above data are what are known as "crude" death rates. By a crude death rate we mean simply the death rate of a given population regardless of age, sex, race, occupation, etc. Since the latter may influence death rates they should, depending upon their importance, be considered in the investigation of the mortality from any disease. When due allowance has been made for any one or all of these factors one obtains what may be termed corrected death rates.

Corrected death rates enable us to determine the expected number of deaths in a given population. The value of knowing the expected number is that it can be compared with the number actually found in a group of individuals suffering from any disease one may wish to investigate. It is the ratio of the actual to expected deaths which gives a clear insight into the effect of any disease on mortality. For example, of 10,000 people living in England at the age of forty years, 97 are expected to die before their forty-first birthday is reached. If we were to find that of 10,000 diabetics living in England at the age of forty years 194 failed to reach the forty-first birthday the death rate would be twice the normal or expected population death rate. That is, the ratio of actual to expected deaths is a quantitative expression of mortality.

Now Table II furnishes an example of the fallacy which results from considering crude death rates by themselves. If we compare the findings of 1921 with those of 1922 we find a decreased death rate in the latter year. It will be recalled that insulin was not available in Montreal for any great length of time in that year, and we therefore had to seek for some other explanation of this decreased rate. On investigation we found that some of our patients went to Toronto and received insulin treatment there during that year. At first sight this appears to be the explanation. We shall find, however, that the results in these few patients did not have the marked effect upon the death rate which they might have been expected to have. As a matter of fact, the death rate in 1922 had actually *increased*, as may be seen by consulting Table IV.

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TABLE IV.

ANNUAL, ACTUAL AND EXPECTED DEATHS AT ALL AGES AMONGST PATIENTS RESIDING IN MONTREAL AND ATTENDING THE CLINIC FOR DIABETES AT THE MONTREAL GENERAL HOSPITAL

			1921			1922			1923			1924			1925			1926			1927		
				Deaths			Deaths			Deaths			Deaths			Deaths			Deaths			Deaths	
Age	Total Population	Montreal Population	Population	Expected	Actual	Population	Expected	Actual	Population	Expected	Actual	Population	Expected	Actual	Population	Expected	Actual	Population	Expected	Actual	Population	Expected	Actual
1	1	1													1	.11462							
2	3	3													1	.02762		1	.02762		2	.05524	
3	3	2	1	.01234														1	.01234		2	.02468	1
4	1	1				1	.00783		1	.00783											1	.00783	
5	5	5							2	.01130		3	.01695		1	.00565					1	.00565	
6	9	8							1	.00466		3	.01398		6	.02796		3	.01398		1	.00466	
7	3	3										1	.00391		3	.01173		7	.02737		5	.01955	
8	2	2							1	.00330		1	.00330		1	.00330		3	.00990		7	.02310	
9	3	3										2	.00564		2	.00564		2	.00564		3	.00846	
10	5	4							1	.00247					3	.00741		4	.00988		2	.00494	
11	8	6							1	.00617		4	.02468	1	1	.00617		4	.02468		4	.02468	
12	4	3							1	.00619		1	.00619		4	.02476		1	.00619		5	.03095	
13	4	4							1	.00622		1	.00622		2	.01244		6	.03732	1			
14	5	5	1	.00625								2	.01250		4	.02500		2	.01250		6	.03750	
15	7	7				1	.00629		1	.00629		3	.01887		2	.01258		5	.03145		4	.02516	
16	11	11				1	.00633	1	5	.03165		4	.02532		4	.02532	1	3	.01899		6	.03798	
17	8	8							3	.01914	1	6	.03828		5	.03190		6	.03828		3	.01914	
18	7	6							2	.01284	1	3	.01926		8	.05136		5	.03210		7	.04494	
19	13	9	1	.00646	1				1	.00646		4	.02584		4	.02584		10	.06460	1	6	.03876	
20	7	7	2	.01304		1	.00652	1	1	.00652		1	.00652		6	.03912		5	.03260		9	.05868	
21	7	6				2	.01318		1	.00659	1	2	.01318		1	.00659		9	.05931		6	.03954	
22	8	4	2	.01330	1	1	.00665		2	.01330					3	.01995		2	.01330		9	.05985	
23	6	6	1	.00672		3	.02016	1	3	.02016	1	3	.02016	1							2	.01344	
24	6	4				1	.00680		2	.01360		3	.02040		2	.01360		3	.02040		6	.04080	
25	9	6	2	.01378	1				4	.02756		2	.01378		4	.02756		2	.01378				
26	15	15	1	.00698		1	.00698		2	.01396		5	.03490	1	4	.02792		7	.04886		8	.05584	
27	11	10				1	.00709		2	.01418		2	.01418		6	.04254	1	6	.04254		12	.08508	
28	6	6				1	.00721	1	3	.02163		2	.01442		2	.01442		6	.04326		8	.05768	2
29	14	13	1	.0 732	1							3	.02196		5	.03660		4	.02928		13	.09516	
30	12	12							3	.02241		1	.00747		3	.02241		8	.05976		9	.06723	
31	18	14				1	.00762		1	.00762		3	.02286		1	.00762		9	.06858		14	.10668	1
32	15	13	2	.01554					2	.01554		2	.01554		5	.03885	1	3	.02331		14	.10878	1
33	22	17	1	.00796		4	.03184	1	3	.02388	1	2	.01592		4	.03184		8	.06368		8	.06368	
34	31	17	1	.00816	1	2	.01632		9	.07344		4	.03264	1	2	.01632		8	.06528		11	.08976	
35	25	23	1	.00837		2	.01674	1	7	.05859		11	.09207	1	4	.03348		11	.09207		12	.10044	
36	20	20	2	.01720		6	.05160		4	.03440		8	.06880		11	.09460	1	10	.08600		13	.11180	
37	26	25	2	.01772		6	.05316	2	18	.15948		9	.07974	1	10	.08860		17	.15062		13	.11518	
38	33	33	1	.00915	1	7	.06405		9	.08235		18	.16470		10	.09150		17	.15555	1	21	.19215	
39	33	29	2	.01890	1	3	.02835		17	.16065		12	.11340	1	18	.17010		18	.17010	3	19	.17955	
40	50	47	1	.00978		6	.05868		8	.07824		24	.23472		18	.17604	3	34	.33252	1	22	.21516	
41	38	32	2	.02030		3	.03045	1	12	.12180		14	.14210	1	28	.28420		21	.21315	1	41	.41615	
42	35	35	4	.04224		5	.05280		5	.05280	1	18	.19008		20	.21120		31	.32736		27	.28512	
43	46	39	5	.05495		9	.09891		11	.12089		9	.09891	1	25	.27475	1	26	.28574		36	.39564	
44	42	38				11	.12606	1	15	.17190		17	.19482		15	.17190		32	.36672		32	.36672	
45	28	27	1	.01200		8	.09600		12	.14400	2	20	.24000		20	.24000		21	.25200		34	.40800	
46	28	28	3	.03768	1	3	.03768		13	.16328		17	.21352		25	.31400		26	.32656		21	.26376	
47	34	28	1	.01320		5	.06600	1	6	.07920		19	.25080		26	.34320	2	30	.39600		28	.36960	1
48	32	20				3	.04164		6	.08328		9	.12492		21	.29148	1	31	.43028		34	.47192	
49	30	26	4	.05852	1	3	.04389		5	.07315	1	8	.11704		16	.23408	1	27	.39501		32	.46816	1
50	48	38	8	.12360	1	8	.12360		7	.10815		7	.10815	1	15	.23175		24	.37080		29	.44805	
51	28	23				10	.16340	2	11	.17974		13	.21242	1	11	.17974		20	.32680		29	.47386	2
52	57	48	3	.05193		7	.12117	1	14	.24234		15	.25965		20	.34620	2	22	.38082		25	.43275	
53	23	22	4	.07356	1	6	.11034		10	.18390	1	15	.27585		19	.34941		24	.44136		22	.40458	
54	36	28	2	.03912		3	.05868	1	12	.23472		15	.29340		21	.41076		27	.52812	1	26	.50856	
55	34	30	1	.02083		2	.04166		7	.14581	1	17	.35411		20	.41660	1	31	.64573		24	.49992	2
56	18	18				3	.06666		6	.13332	1	8	.17776		20	.44440		27	.59994	2	32	.71104	
57	25	21				3	.07125	1	7	.16625		4	.09500		15	.35625		23	.54625	1	29	.68875	
58	38	29				3	.07623		8	.20328		12	.30492		10	.25410		22	.55902	1	24	.60984	1
59	26	24				1	.02722		8	.21776		11	.29942	1	17	.46274	3	14	.38108	2	27	.73494	1
60	30	26	2	.05842		2	.05842	1	5	.14605	1	9	.26289	1	18	.52578		20	.58420	1	15	.43815	1
61	13	13	3	.09414		2	.06276		4	.12552		5	.15690		11	.34518		20	.62760		21	.65898	1
62	25	24				6	.20238	1	5	.16865	1	9	.30357	2	10	.33730	2	17	.57341	1	21	.70833	
63	22	20	2	.07264	1	2	.07264		6	.21792		6	.21792	1	11	.39952	1	14	.50848		20	.72640	1
64	11	11	1	.03912		1	.03912		3	.11736		6	.23472		7	.27384	1	16	.62592	1	14	.54768	1
65	14	14	3	.12663		3	.12663		4	.16884		3	.12663		8	.33768		7	.29547		18	.75978	2
66	17	14	3	.13662		4	.18216	1	7	.31878		6	.27324	1	4	.18216		10	.45540	1	8	.36432	
67	5	5				4	.19672	1	4	.19672	1	8	.39344		5	.24590		4	.19672		11	.54098	
68	10	9							4	.21268	1	4	.21268		9	.47853		6	.31902		9	.47853	3
69	8	8	1	.05748		2	.11496	1				5	.28740	1	5	.28740	1	10	.57480		7	.40236	
70	11	11							2	.12438		2	.12438		8	.49752		6	.37314		12	.74628	
71	1	1							1	.06731					2	.13462		8	.53848		6	.40386	
72	8	8				1	.07290		1	.07290	1	2	.14580	1	2	.14580	2	3	.21870		11	.80190	1
73	1	1				1	.07896								1	.07896					3	.23688	
74	6	6							1	.08553		3	.25659	2	1	.08553		4	.34212				
75	3	3				1	.09267					2	.18534		2	.18534		1	.09267		4	.37068	
76	1	1							1	.10043					3	.30129		2	.20086		1	.10043	
77												1	.10885					3	.32655		2	.21770	
78	3	3													1	.11794					6	.70764	
79	1	1																2	.25562				
80	1	1							1	.13850											2	.27700	
81	2	2										1	.15000		1	.15000		1	.15000				
82															1	.16240		1	.16240		1	.16240	
83																		1	.17573		1	.17573	
84	1	1																			2	.38028	
85																							
86																							
Actual/Expected Deaths x 100		535					668			280			243			200			109			107	

In this table the "actual" and "expected" deaths for the different ages of our diabetics have been calculated. For each year the "actual" and "expected" values were then totalled and from them were obtained the ratios of "actual" to "expected" deaths. These are shown at the foot of the table in their respective columns.

It will be noted that the death rate from diabetes in 1921 was 535 per cent of the normal and in 1922 it had actually increased, being 660 per cent of the normal. With the more general application of insulin treatment in 1923 we begin to find an appreciable fall in the death rate. During this year it was 280 per cent of the normal. In 1927 we note an almost normal death rate.

The data for calculating the ratios of "actual" to "expected" death rates are given in detail in Table IV, in order that they may be made use of in ways different from the one shown. For example, ratios of actual to expected death rates may be calculated for the different decades, as in Table V and in Table VI the ratios are given for four different age periods—namely, ages 1 to 20 years, 21 to 40, 41 to 60 and 61 to 80 years respectively. From whatever table one cares to employ, it is obvious that the death rate from diabetes has decreased in our clinic.

Death rates obviously depend not only upon the severity of the diabetes itself, but also upon the presence of associated conditions or complications. Is it therefore possible that the laws of chance so operated that we had in our clinic a group of exceptionally mild diabetics? The following table (Table VII) yields some

TABLE V.

ACTUAL AND EXPECTED DEATHS* AT DIFFERENT DECADES OF LIFE. RE-CALCULATED FROM TABLE IV.

	Before insulin			*Since insulin*		
Ages	*Actual*	*Expected*	*Actual / Expected*	*Actual*	*Expected*	*Actual / Expected*
1–10				1	0.53811	1.775
11–20	3	0.04489	66.830	6	1.15615	5.189
21–30	4	0.11617	34.432	7	1.34054	5.222
31–40	7	0.44114	15.868	17	4.72942	3.594
41–50	6	1.07952	5.558	15	12.65553	1.185
51–60	7	1.03889	6.737	28	18.18168	1.535
61–70	5	1.38740	3.603	24	17.85036	1.305
71–80				7	7.30259	0.959

* Assuming all those missing to be dead.

TABLE VI.

ACTUAL AND EXPECTED DEATHS* AT DIFFERENT AGE PERIODS. RE-CALCULATED FROM TABLE IV.

	Before insulin			*Since insulin*		
Ages	*Actual*	*Expected*	*Actual / Expected*	*Actual*	*Expected*	*Actual / Expected*
1–20	3	0.06506	46.11	7	1.68426	4.16
21–40	11	0.55731	19.73	24	6.06994	3.95
41–60	13	2.11841	6.13	43	29.83721	1.44
61–80	5	1.62193	3.08	31	25.15295	1.23

* Assuming all those missing to be dead.

TABLE VII.

ASSOCIATED CONDITIONS AND COMPLICATIONS OF DIABETES IN THE MEDICAL AND SURGICAL WARDS OF THE MONTREAL GENERAL HOSPITAL DURING 1925 AND 1926.

Medical Wards

1925		*1926*	
Disease	*Incidence*	*Disease*	*Incidence*
Pulmonary tuberculosis	3	Cerebral hæmorrhage	3
Myocarditis	3	Lobar pneumonia	3
Endocarditis, acute	2	Arterio-sclerosis	7
Cerebral hæmorrhage	2	Impetigo	1
Arterio-sclerosis	5	Pituitary tumour	1
Chronic nephritis	1	Chr. cholecystitis	2
Angina pectoris	1	Myocarditis	2
Pneumonia	2	T.B.C. peritonitis	1
Rheumatoid arthritis	1	Exophthalmic goitre	2
Acute nephritis	1	Alcoholism	1
Hyperthyroidism	2	Pleurisy with effusion	1
Chr. pancreatitis	2	Cardio-renal	8
Cerebral lues	1	Aortic disease	1
		Primary anæmia	1
		Pulmonary T.B.C.	3
		Liver abscess	1
		Insanity	1

TABLE VII.—*Continued.*

Surgical Wards

1925		*1926*	
Disease	*Incidence*	*Disease*	*Incidence*
Cholecystitis	2	Carbuncle	4
Pyonephrosis	1	Gangrene of foot	6
Perforated duodenal ulcer	3	Chr. cholecystitis	8
Carbuncle	9	Acute pancreatitis	1
Gangrene of foot	5	Strangulated hernia	3
Strangulated hernia	2	Toxic adenoma	2
Furunculosis	1	Stricture of urethra	1
Acute appendicitis	1	Cystocele	3
Osteomyelitis (foot)	1	Pyonephrosis	1
Abscess of thigh	1	Mastoiditis	1
Duodenal ulcer	1	Sarcoma of bladder	1
Fracture of femur	1	Sarcoma of leg	1
Stricture of urethra	1	Prolapse of uterus	1
Carcinoma of intestine	1	Prostatic hypertrophy	1
Acute pancreatitis	1	Carcinoma of breast	3
Peritonitis (from appendix)	1	Ac. conjunctivitis	1
		Acute appendicitis	2
		Abdominal wall abscess	1
		Crushed hand	1
		Fracture of thigh	1
		Fracture of shoulder	1
		Furunculosis with sepsis	1
		Tonsillectomy	1

information. Here are recorded our experiences of 1925 and 1926. These two years were selected for no other reason than that the information was immediately available, having been obtained for another purpose some time ago. I may say there is no reason to believe that our experience this year (1927), and that of two years prior to those shown in this table (1923-24) were not practically identical.

Here we observe the usual diseases met with in medical and surgical wards. From the list of surgical conditions it will be noted that there must have been many operations of long duration and requiring long periods of anæsthesia. An idea of the anæsthesias may be had from the following table (Table VIII) in which are listed the types of anæsthetics, their incidences and durations. Local and spinal anæsthetics are not included.

In spite of this experience the mortality was low in the surgical wards. During the two years prior to insulin (1921 and 1922) there were 21 operations on diabetics and 8 deaths, the "crude" death rate, therefore, was 38.1 per cent. During the two years referred to since insulin, (1925 and 1926) there were 76 operations and only 4 deaths, an incidence of 5.2 per cent. Here are obviously not included deaths resulting from surgical conditions, but for which no operations were performed. Although it is a wise procedure to avoid anæsthesia in a diabetic if possible, the data given shows what can now be done with the aid of insulin.

TABLE VIII.

TYPE OF ANÆSTHETIC, INCIDENCE OF ITS USE AND DURATION OF ANÆSTHESIA

Approximate duration	*—Anæsthetic— Nitrous oxide number*	*Ether number*
15 minutes	6	–
30 "	5	3
45 "	2	3
60 "	2	4
75 "	1	3
90 "		2
105 "		3
120 "		6
135 "		3
150 "		4
165 "		2
180 "		3

TABLE IX.

CAUSES OF DEATHS OF DIABETICS AND THEIR INCIDENCES AT THE MONTREAL GENERAL HOSPITAL

Cause	*Year*						
	1921	1922	1923	1924	1925	1926	1927
Acute pancreatitis						1	1
Angina pectoris		1		1		1	
Carbuncles	1	3		2	3		1
Carcinoma							1
Cerebral hæmorrhage	1			1		3	1
Coma (diabetic)	5	8		2	1	1	2
Gangrene	2	2	4	2	3		1
Pneumonia		1		1		1	
Pyelonephritis							1
Staphylococcus septicæmia						1	1
Tuberculosis		1		1	1		1
Unknown causes				1	1		

The possible effects of insulin on mortality rates may be seen from another point of view, that is, by comparing the causes of death before insulin, with the causes of death since insulin. Comparative data are given in the above table (Table IX). During 1921-22 approximately 50 per cent of the deaths were due to diabetic coma. In 1923 there were no deaths from diabetic coma, and during the last four years the deaths from diabetic coma were few, the great majority of patients having died from

some condition other than the diabetic acidosis. It may here be stated, that, again, in order to be conservative in our estimates, we have assumed that though a large percentage of these patients did not die from diabetic acidosis, all these deaths were the result of diabetes. This is a reasonable assumption. For example, to take one cause of death, namely, gangrene. It appears reasonable that had the individual not had diabetes he probably would not have had gangrene *at the age* at which it occurred. Had he not had gangrene he probably would not have had septicæmia and, therefore, would probably not have died at the age he did die. Again, if he did not die of an infected gangrene, but of broncho-pneumonia following anæsthesia and operation he still died of diabetes. If he had had no gangrene he would not have been operated upon for the relief of it. Had there been no operation, there would have been no anæsthetic and therefore probably no pneumonia.

Though these appear to be satisfactory results, the following table (Table X) shows that they could have been improved upon. In this table the causes of "known" deaths of all diabetics since insulin are correlated with the diets of the individuals. Some of these patients were on rigid diets and others, according to their own statements, or those of their friends, had only been, or were supposed to have been, avoiding excessive use of carbohydrates. Others were not following any kind of diets. Amongst the latter group of patients some knew they had diabetes and others did not. All of these individuals may therefore be divided into two groups, namely, those who were on rigid diets and those who were not. The result of this division is striking. Disregarding the detailed causes of deaths it will be noted that of these 42 patients only 7 had been on rigid diets. Considering the causes of death the picture is almost as striking. Diabetes, when not under control, lowers the resistance of the individual to infections and also tends to hasten arterio-sclerosis. Of the 42 deaths, 16 were due to gangrene and carbuncles. In only one case was death due to one of these causes in spite of rigidly adhering to diet. Gangrene can be prevented in the great majority of cases of diabetes. Though we cannot assure the diabetic that if he follows treatment he will not develop gangrene, we can tell him that the probability is that he will not. Up to September, 1927, we have had 52 cases of gangrene. Only five of these were our own patients at the time gangrene developed. The remainder came to our clinic with gangrene. Of our own five patients we know definitely that two were not adhering to the diets prescribed. As a matter of fact in both cases the diets were very grossly abused. This low incidence of gangrene in our own cases may have been the result of the operation of the laws of chance. It appears, however, extremely unlikely that chance should so operate over a period of six years and in a group of over 1,000 diabetics.

TABLE X.

DIET IN RELATION TO CAUSES OF DEATH SINCE INSULIN

Immediate cause of death	*—On diet—* *Rigid*	*Approximate*	*—Not on diet—* *Known to have diabetes*	*Not known to have diabetes*
Acute pancreatitis	1		1	
Angina pectoris		1	1	
Carbuncle		1	3	2
Cerebral hæmorrhage	1	1	2	1
Coma (diabetic)			4	2
Carcinoma	1			
Gangrene	1	2	3	4
Pneumonia	1			1
Staphylococcus septicæmia			1	1
Tuberculosis	1	1	1	
Pyelonephritis				1
Unknown causes	1			1

Combining all experiences referred to, it is obvious we have practically incontestable evidence that insulin can lower the mortality rate from diabetes. Though this is generally accepted we have gone into much detail to demonstrate it for the following reason. Should we meet with data which may lead to opposite conclusions, there are only three possible explanations. Firstly, the interpretation of the data may be faulty; the mortality rates may be affected by variables which have not been recog-

nized and the death rate may be more apparent than real. Secondly, insulin may not have been used when it should have been. Thirdly, it may have been used but may not have been employed properly.

As a matter of fact we have such data just referred to, as Table XI demonstrates.

In this table are shown the mortality rates from diabetes in large countries, states, provinces and, equally important, in large cities with well-equipped hospitals for the efficient management of the diabetic.

TABLE XI.

DEATHS FROM DIABETES MELLITUS PER 100,000 POPULATION BEFORE AND SINCE INSULIN

	1921	1922	1923	1924	1925	1926
England and Wales	10.8			10.9	11.2	11.5
United States:						
Total registration area	16.8	18.4	17.9	16.6	16.9	
Cities in registration states	20.2	22.4	21.9	20.2	21.1	
Rural part of registration states	13.6	14.9	14.3	13.4	13.1	
Registration cities in non-regist. states	17.0	15.1	14.9	12.3	15.3	
All registration cities	20.1	22.2	21.7	20.0	20.9	
Large cities:						
Baltimore	22.1	26.0	24.2	23.1	24.9	
Boston	19.8	29.3	24.8	23.7	20.9	
Chicago	20.3	23.2	21.8	18.8	21.5	
New York	24.1	27.9	27.4	25.7	25.9	
Philadelphia	19.1	20.5	20.9	21.3	21.9	
St. Louis	21.1	23.4	22.0	23.0	21.8	
Canada:						
Quebec	7.8	8.3	7.8	9.0	8.1	10.0
Ontario	11.4	12.4	13.1	10.8	10.9	12.7
Montreal	11.0	10.9	10.7	13.1	10.7	13.7
Toronto	12.6	14.5	15.6	13.1	12.8	15.6

(I wish here to gratefully acknowledge the co-operation of all those in the different government offices responsible for the compiling of such data, who so promptly responded to our letters requesting this information).

From this table we find that the death rate from diabetes in large populations has not only not decreased, but has in many cases increased. Thus, in England and Wales, the death rate was 10.8 per 100,000 in 1921, that is, before insulin, and in 1926 the latest data available, it was 11.5 per 100,000 population. The same applies to the United States. In 1921 the death rate from diabetes in the total registration area was 16.8 per 100,000 population and in 1926, the latest available data, it was 16.9. The striking findings in the United States records are that in large cities, where one expects the best form of treatment, the death rates were found to have actually increased.

An increase is found in the provinces of Ontario and Quebec and in the cities of Montreal and Toronto. Since this table was compiled reports have been received from Edinburgh, Prussia and Bavaria. The stories are practically the same. In Edinburgh in 1921, prior to insulin, the death rate was 9.3 and in 1926, the latest available data, it was practically the same, namely 9.5 per 100,000 population. In Prussia the death rates for 1921 and 1925 were 6.6 and 10.8 respectively. For Bavaria the data to 1924 only are available. In 1921 the death rate was 5.6 per 100,000 population and in 1924 it was 6.5.

ANALYSIS OF THE INCREASED DEATH RATES

Let us now consider these findings. Are the interpretations of the data faulty? The figures given are what statisticians recognize as "crude" data. A clearer picture would be obtained if they were "adjusted". For each locality, however, comparisons were made, from the same population, from year to year. This tends to minimize errors of "crude" data.

One possible factor to consider is the increased attention paid to the disease owing to the publicity given insulin. It will be recalled that an increased death rate was also noted following the announcement of Allen's treatment in 1913. Insulin has however been operative for over four years. The effects of this publicity should by now have been reduced or at least be on the decline.

Has death been merely delayed for a few years and is a "piling" effect now being noted? If this is so, it really means that after a time insulin fails to act. This is contrary to clinical

experience with patients who follow treatment. There is also no experimental evidence that, in time, insulin fails to act. Again, this can hardly be the correct explanation since it would be difficult to reconcile it with the fact that the death rates of large hospital clinics have decreased.

Another possible explanation suggested is that because of improved method of diagnosis more deaths are properly recorded. There have, however, been significant improvements during the last four years. The importance of urinalysis was repeatedly emphasized in the literature before insulin and more so when insulin was first used. The conclusion therefore is that the death rates observed in large populations are probably not apparent but real. If the conclusion is correct we are left with two possible causes, namely, either insulin has not been used when it should have been, or if it was used it was not done so properly.

Improper use of Insulin

Judging by the experience we have had of observing a large number of diabetics it is our impression that though both these causes are operative, the latter is the most important factor. A number of diabetics are using insulin when the disease can be properly controlled by diet alone. A much larger number of diabetics have the idea that by merely taking more insulin they can take much more food than the minimum required. During the last three weeks we have met with five examples of these cases. One, a woman, on admission to the hospital gave a history of taking 50 units of insulin a day. Her diet was not balanced against the insulin. She received no insulin since her admission. Her urine became sugar free and her blood sugar returned to the normal on a diet compatible with her normal requirements. She has since been discharged under the same conditions. The second case is that of a man who took 60 units, and the third is that of a girl who was taking 35 units of insulin a day. In neither of these cases was insulin required. Sooner or later these patients were bound to have severe insulin reactions. We know of four deaths from this cause.

The fourth patient, a man of 28, was taking 80 units of insulin a day. His actual requirement was found to be 10 units. He had no sugar in his urine and was very much overweight. There was an additional danger in this case. Knowing that he might some day suffer a severe insulin reaction, he ate a large amount of food but avoided having sugar in his urine. The result was a fasting blood sugar of 0.264 per cent. He thus acquired a raised kidney threshold for sugar and thereby urinalysis ceased to be of value in his case as an index of progress.

In order to guard against what he thought would be too much insulin, the fifth patient examined his urine frequently and if he found no sugar he would take enough food to produce a trace of sugar. In other words he kept himself continuously in the state of active diabetes.

The results of the practices of the last two patients were identical. Both had marked degrees of hyperglycæmia. I recognize that some workers in this field tend to minimize the importance of this finding. Why, I do not know. Hyperglycæmia indicates active diabetes whether the patient has or has not any sugar in the urine. It indicates that the mechanism of carbohydrate metabolism is faulty. It indicates that the rate of utilization of sugar, including the combined mechanisms of oxidation and storage, cannot keep pace with the rate of absorption of sugar from the alimentary canal or the rate of its production in the body tissues. The result of hyperglycæmia is definite. It means a progressive increase in the amount of insulin required. This means a change from one hypodermic injection to two a day and eventually to three or more. In the juvenile diabetic, where one hopes eventually to discontinue the insulin at first required, hyperglycæmia is fatal. This was clearly shown recently by Gladys Boyd in a careful study of the children under her care. All children were divided into 4 groups:—

(a) Patients who were adequately controlled practically all of the time.

(b) Patients who were kept under control part of the time but had frequent breaks in tolerance.

(c) Patients with frequent mild glycosuria.

(d) Patients under no control.

Improvement was found to be directly proportionate to the degree of control. Gladys Boyd concludes that "the criterion of successful treatment consists in the absence of gly-

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cosuria and the maintenance of a normal blood sugar." The conclusion appears so obvious and the idea is so old, one wonders why it is again emphasized. In view of the fact that this ideal condition is not always aimed at even by some workers in this field, it does not appear to be entirely out of place. It is the patients with hyperglycæmia, with or without glycosuria, who usually get carbuncles and gangrene, in spite of looking well and appearing to make good progress. We have found this complication of hyperglycæmia without glycosuria sufficiently frequent to make it a rule never to trust the clinical picture as an index of progress in insulin treated diabetics. It is one of the very few exceptions in medicine where the clinical picture is not only useless but may be misleading. Blood sugar examinations are here indispensable.

When a diabetic dies in coma typical of the disease, that is, when he acquires a bright red colour of the skin, the Küssmaul respiration, the soft eyeball, the dry "sandpaper"-like tongue and sugar, acetone and diacetic acid, albumin and casts in the urine, and a leucocytosis, no one questions the cause of death. Diabetes is held directly responsible. Such cases are, however, now, relatively few in number. We now find death in the absence of sugar and acetone bodies in the urine and this may be attributed to almost any condition except diabetes. If, in spite of diet and insulin, the mortality amongst diabetes cannot be lowered, the outlook in this disease is rather gloomy for the physician, but particularly for the patient and relatives. The relatives receive very little comfort when told that the treatment of the diabetes was successful but the patient died of some other condition. Their only interest is the death and not the condition which produced it. Fortunately, another picture can be painted.

A number of deaths will be found in spite of careful attention to diet and insulin. Diabetes tends towards degenerative processes. In spite of all care arterio-sclerosis and its consequences, cerebral hæmorrhage, heart failure and gangrene, may occur and lead to death, but arterio-sclerosis may also occur in non-diabetic individuals and lead to death. The diabetic individual is susceptible to infections and these may occur and lead to death, but they also occur in non-diabetic individuals and lead to death. To elucidate the picture one requires a large number of observations over a reasonable length of time and proper methods of investigation, and it may here be stated that the results of superficial analysis do not agree with those of a careful statistical investigation. If we take into consideration the expected death rates at different ages and then, regardless of the causes of death, divide all patients into those who follow dietary regulations and those who do not, the mortality is indisputably much greater amongst those who do not follow their treatment.

Regardless of any disease found at the time of death, if all patients who received insulin and who actually required it, are divided into those who employ it properly and those who do not, we find that, by far the great majority die, not in spite of the use of insulin, but because of the abuse of it. The advice which we should give our patients is obvious.

The author wishes to thank Mr. Henry J. Elliott, K.C., for his gift to the Metabolism Department in the Hospital, of a calculating machine, by the aid of which the above calculations have been greatly simplified.

An Address

ON

THE SEASONAL VARIATION OF THE ANTIRACHITIC EFFECT OF SUNSHINE AND ITS EFFECT ON RESISTANCE TO DISEASE*

By Alan Brown, M.B., (Tor.), and Frederick F. Tisdall, M.D.

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A REVIEW of the literature on the etiology of rickets reveals the fact that very little has been accomplished in this regard from the time of Glisson till the past ten years. Theories have been numerous and very divergent. It remained for Mellanby[1] in 1918 to demonstrate the presence of a substance possessing antirachitic properties effective in the prevention of this condition. It was not certain, however, whether this substance was separate and distinct from vitamine A until McCollum[2] and his coworkers definitely demonstrated it to be so, and gave it the name of vitamine D. The most concentrated source of this vitamine is now known to be cod liver oil.

In 1919, Huldschinsky[3] clearly showed the curative effect of exposure to the ultra-violet rays emanating from a mercury-vapour quartz lamp. Since these observations were made many others have demonstrated the accuracy of his conclusions.

In 1921, Hess and Unger[4] showed that a similar effect could be produced by exposure to the direct rays of the sun; this observation was further corroborated by extensive animal experimentation by Park[5] and Hess.[6]

The next great advance regarding the etiology of rickets was an observation made independently by three groups of workers, viz., Rosenheim and Webster[7] in England; Hess, Weinstock and Helman,[8] and Steenbock and Black[9] in the United States. These investigators demonstrated that food containing cholesterol or allied substances could be rendered antirachitic by exposure to the ultra-violet rays. This interesting discovery has been further investigated, and it has been shown in Germany, United States and England[10-18] that the cholesterol is not the activated substance, but instead it is ergosterol which is usually present in cholesterol as an impurity in the proportion of 1-2000 parts. An indication of the potency of this substance may be gleaned from the fact that the administration daily of 1/10,000 mg. of activated ergosterol to a rat on a rachitogenic diet cures or prevents the disease, and that 5 mg. of this substance produce the same antirachitic effect as 1 litre of active cod liver oil.

The curative effect of the rays from either a lamp or the sun is due to certain rays present in the ultra-violet section of the spectrum. The most intensive studies of the effect of sunshine on health have been made by Dorno[19] at Davos in the Swiss Alps. Sunshine is composed of invisible heat rays, which have a wave length of 760 millimicrons or longer (millimicron is one millionth of a millimeter in length); visible light, which varies in length from 760 to 380 millimicrons; and invisible ultra-violet rays, which range from 380 to 290 millimicrons. The heat rays comprise about 60 per cent of the solar radiation; the visible rays, 40 per cent; and the ultra-violet rays, less than 1 per cent. As a result of experimental work with cholesterol, it has been shown that the 302 line possesses marked antirachitic potency whereas the 313 line exerts very little specific power.[20] It is thus perfectly clear that the effective rays from the sun for either the prevention or cure of rickets must be the shortest rays and ranging from 290 to 313 mm. in length.

The short ultra-violet rays are readily cut off by the smoke, dust and moisture in the atmos-

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phere. It is therefore evident that they will be markedly reduced in the winter time, and also in the early morning and late afternoon, when the rays have to pass through a greater distance of our atmosphere than when the sun is high in the sky. Dorno, in the Swiss Alps, found that the ultra-violet content of the mid-day sun in January was only about 10 per cent of that of the mid-day sun in July. He also found that the shortest ultra-violet rays found at mid-day in December were 12 mm. longer than those found in July. With the exception of the determinations just reported by Best and Ridout,[21] of Toronto, no measurements of these rays in Canada or the United States have been recorded.

Dorno's measurements are extremely important and interesting, but cannot be applied on this continent without reservation on account of the difference in local weather conditions and the difference in altitude.

As long ago as 1884 Kassowitz commented upon the seasonal variation in rickets as being one of the striking variations of the disease. In view therefore of our present knowledge of the rôle played by sunshine in the prevention and cure of this disease through irradiation of both the living individual and his food, the importance of a study of the seasonal variation of its antirachitic action is at once apparent.

In planning an experiment of this type, to extend over a period of one year, many difficulties were encountered. We chose as our experimental animal the albino rat, and the question at once arose as to how this animal would stand the exposure to below zero weather. There was no information in the literature to aid us in this regard, so we had to construct specially heated cages. Each week throughout the year from 30 to 40 rats were started under the desired experimental conditions. They were fed McCollum's rachitogenic diet 3143. The majority were placed outside daily, while controls were kept inside and carefully protected from all sources of ultra-violet rays. After four weeks they were all killed and examined.

A study of the sunshine records, kindly furnished by the Dominion Meteorological Bureau situated within half a mile of the hospital, showed the impossibility of attempting to obtain anything like a two hour daily exposure to sunshine throughout the year. It is, therefore, quite evident from the practical standpoint that it would be more valuable simply to put the rats out for a two-hour period daily from 11 a.m. to 1 p.m., just as an infant would be placed outdoors, regardless of the amount of sunshine during this period. Consequently, a two-hour exposure means that for a certain percentage of this time sunshine was available, while for the remainder of the time the rats were receiving skyshine or reflected light from the clouds and sky. Naturally, during the winter months less sunshine was secured than during the summer months, but this does not interfere with the practical value of the conclusions. All the observations were made on the roof of the hospital, five stories high and exposed to the dust and smoke of the average city.

The methods employed for determining the degree of rickets were: (1) the estimation of the inorganic blood-phosphorus; (2) the determination of the percentage of ash in the bones; (3) roentgenograms of the long bones of the legs. All of which have been proved adequate for estimating the degree of growth in the skeletal system.

Results

After comparing the chemical and x-ray examinations of the rats having a two-hour daily exposure with those kept inside on the same diet, it was shown that in Toronto there is a slight but definite antirachitic effect of sunshine during the winter months. At the end of February and the first week in March a very sharp increase occurs, which is maintained throughout April and May. It was further observed that the antirachitic effect of April and May sunshine during the hours of 11 a.m. and 1 p.m. is approximately eight times as great as the antirachitic effect during December, January and the greater part of February. The effect of fresh cold air as an antirachitic factor was also studied and found to be negligible.[22]

Our results in regard to the seasonal variation of the antirachitic effect of sunshine are of greater value for areas in approximately the same latitude as Toronto, as the antirachitic effect of sunshine is determined to a large degree by the height of the sun in the sky, which in turn varies with the latitude. A map of the North American continent shows that Toronto is in the same latitude as many of the thickly

populated northern states, a fact which is seldom realized.

Our results for the mid-day period (11 a.m. to 1 p.m.) are not only of interest in view of the two-hour daily exposure of the rats, but are also of more value than the total daily hours of sunshine for comparative purposes, as infants cannot be exposed to the available sunshine from sunrise to sunset. Average values furnished by the Dominion Meteorological Bureau show that in January from 11 a.m. to 1 p.m. the sun shines less than one-third of this time, in April two-thirds, while in July it increases to three-quarters of the time. The antirachitic effect of sunshine as determined biologically with the rats, increased tremendously the last week in February and the first week in March, yet from a study of the meteorological tables there is apparently very little relationship between the amount of available sunshine and the increase in its antirachitic effect. Also the measurements made by Best at Toronto of the ultra-violet radiation does not show any marked increase. The most probable explanation therefore of the sudden increase of the antirachitic effect of the sun's rays in March is that there is an increase in the shorter and more effective rays.

A second series of experiments, conducted along the same lines as previously indicated, was carried out to observe the effect of "skyshine". The term skyshine is used to designate the sun's rays which are reflected from the sky and clouds in contra-distinction to the rays received directly from the sun itself. An object placed on the sunny side of the street receives not only rays from the sun but also the reflected rays from the sky. If placed on the shady side of the street only the rays reflected from the sky (skyshine) are received. If the object is again placed on the sunny side of the street and a long cylinder pointed directly at the sun, placed over it, the rays from the sky would be cut off by the walls of the cylinder and only the rays directly from the sun would pass along the inside of the cylinder to the object at the bottom. From a study of our roentgenograms and chemical findings it is found that the antirachitic effect of skyshine is approximately one-half to two-thirds as great as that produced by what is ordinarily called sunshine (rays from the sun plus reflected rays from the sky).[23]

In view of the antirachitic effect of skyshine, which does not cause "sunburn", it is of interest to note that the burning or reddening of the skin, which is usually taken as the unit of measurement of ultra-violet therapy, must now be regarded simply as an accompanying phenomenon, which may or may not be a measurement of the amount of ultra-violet rays received.

A third series of experiments was conducted to test the value of various glasses permeable to ultra-violet rays. The glasses tested were vita-glass, vioray glass and corning special glass. The rats were exposed on the roof in their cages, which in turn were enclosed by the glass to be tested. The results obtained indicated that the antirachitic effect of the sun's rays through these special glasses is 25 to 50 per cent of the antirachitic effect obtained without the use of glass. No obvious differences could be detected in the efficacy of the three glasses. Rats were also placed in a room, one, three, and five feet from an ordinary sized window glazed with vioray glass. The results obtained indicate that the value of skyshine passing into a room through an ordinary sized window glazed with special glass is practically neglible. This is what would be expected when one considers the extremely small percentage of the total sky which is visible through an ordinary sized window. In order to obtain much benefit it is necessary for the patient to receive the direct rays of the sun through the glass or to be exposed in a solarium which will allow rays to enter from a considerable portion of the sky.[24]

A fourth series of observations was made by Dr. Chant Robertson of the School of Hygiene on a number of rats, controlled and fed and given sunlight as previously indicated, to determine if there existed any increased resistance in the rats exposed two hours daily to the sunshine. A special low virulence organism pathogenic to albino rats was isolated and injected into the animals. It was observed that as a result of exposure to the sun twice as many young rachitic rats survived an intra-peritoneal injection of the living micro-organisms as compared with a similar group of control rachitic rats kept inside.[25]

A fifth series of observations was conducted under similar conditions. These last experiments consisted of an estimation of the acidity

of the intestinal contents of the rats at various levels of the bowel. The results showed a definitely increased acidity throughout as a result of exposure to sunshine, indicating, of course, better digestion.[26].

General Conclusions

1. The sun's rays in December, January and February in the latitude of the City of Toronto produce a slight but definite antirachitic effect on rats fed a rachitogenic diet.

2. A very sharp increase occurs in the antirachitic effect of sunshine about the first of March.

3. The antirachitic effect of April and May sunshine is approximately eight times as great as that of December, January and February sunshine.

4. The antirachitic effect of skyshine (reflected rays from the sky and clouds) is approximately one-half to two-thirds as great as that produced by what is ordinarily termed sunshine (rays from the sun plus the reflected rays from the sky).

5. Reddening of the skin by ultra-violet rays is not a suitable unit for measurement of ultra-violet therapy. It should be considered simply as an accompanying phenomenon which may or may not be a measurement of the ultra-violet rays received.

6. Sunshine which has passed through corning glass, vita-glass and vioray has from 25 to 50 per cent of the antirachitic effect obtained without the use of glass.

7. The use of special glass is justified from March on as our inclement spring weather prohibits the exposure of patients to sunshine which at this time has a great antirachitic effect.

8. Sunshine definitely increases the resistance of albino rats to infection with a specific organism.

9. Sunshine increases the acidity of the intestinal tract of rachitic rats.

Practical Deductions

1. From the first of March till the middle of October the antirachitic effect of the sun's rays is much greater than during the other months of year. This increase begins abruptly about the first of March and ends toward the latter part of October. An infant therefore exposed during these periods, even though on a rachitic diet, would be greatly benefited; the most valuable period of the day being between 11 a.m. and 1 p.m., except during the extremely warm weather when the earlier hours of the day would be more suitable.

2. Skyshine has approximately from 50 to 60 per cent of the value of sunshine, that is to say, an infant placed on the shady side of the street would receive approximately two-thirds of the benefit that he would if he were on the sunny side. This is a point frequently unrecognized.

3. From October to March the antirachitic effect of the sun is so slight that the benefit to be derived is purely problematical, and has yet to be determined for the human individual.

4. The use of the special glasses is of value from March to June when the chemically active rays are very beneficial and the weather too inclement for outside exposure.

5. The experimental data in reference to the resistance of the rats to infection are very illuminating and undoubtedly indicate that the same effect would be derived by the human.

6. The increased acidity of the intestinal contents of the exposed rats is additional evidence that the sun's rays definitely aid in digestion.

Our thanks are due to the Department of Health of the Province of Ontario for a grant in aid of the expense of this investigation and to the Honourable Dr. Forbes Godfrey, Minister of Health, for his interest in this work and the authorization of the grant from his department.

References

1. Mellanby, E., *J. Physiol.*, 1918, lii, 11.
2. McCollum, E. V., Simmonds, N., Becker, J. E., and Shipley, P. G., *J. Biol. Chem.*, 1922, liii, 292.
3. Huldschinsky, K., *Deutsch. med. Wochenschr.*, 1919, xlv, 712.
4. Hess, A. F., and Unger, L. J., *J. Am. M. Ass.*, 1921, lxxvii, 39.
5. Powers, G. F., Park, E. A., Shipley, P. G., McCollum, E. V., and Simmonds, N., *J. Am. M. Ass.*, 1922, lxxviii, 159.
6. Hess, A. F., Unger, L. F., and Pappenheimer, A. W., *J. Biol. Chem.*, 1922, l, 77.
7. Rosenheim, O., and Webster, T. A., *Lancet*, May 16, 1925, i.
8. Hess, A. F., Weinstock, M., and Helman, F. D., *J. Biol. Chem.*, 1925, lxiii, 305.
9. Steenbock, H., and Black, A., *J. Biol. Chem.*, 1925, lxiv, 63.
10. Hess, A. F., and Weinstock, M., *J. Biol. Chem.*, 1925, lxiv, 193.
11. Hess, A. F., and Windaus, A., *Proc. Soc. Exper. Biol. & Med.*, 1926, xxiv, 171.
12. Hess, A. F., and Windaus, A., *Proc. Soc. Exper. Biol. & Med.*, 1927, xxiv, 369.
13. Schlutz, F. W., and Morse, M., *Am. J. Dis. Child.*, 1925, xxx, 199.

14. Schlutz, F. W., Ziegler, M. R., and Morse, M., *J. Biol. Chem.*, 1927, lxxiii, 209.
15. Rosenheim, O., and Webster, T. A., *Biol. Chem. J.*, 1927, xxi, 127.
16. Isolation of Vitamines, Berlin letter, *J. Am. M. Ass.*, 1927, lxxxviii, 854.
17. Hess, A. F., and Windaus, A., *Proc. Soc. Exper. Biol. & Med.*, 1927, xxiv, 461.
18. Rosenheim, O., and Webster, T. A., *Biol. Chem. J.*, 1927, xxi, 389.
19. Dorno, C., Klimatologie im Dienste der Medizin., Brunswick, Vieweg & Son, 1920.
20. Hess, A. F., and Weinstock, M., *Proc. Soc. Exper. Biol. & Med.*, 1927, xxiv, 759.
21. Best, C. H., and Ridout, *Am. J. Dis. Child.*, Nov., 1927.
22. Tisdall, F. F., and Brown, A., *Am. J. Dis. Child.*, Nov., 1927.
23. Tisdall, F. F., and Brown, A., *Am. J. Dis. Child.*, Nov., 1927.
24. Tisdall, F. F., and Brown, A., *Am. J. Dis. Child.*, Nov., 1927.
25. Robertson, E. C., *Canad. M. Ass. J.*, 1927, xvii, 1033.
26. Tisdall, F. F., and Price, H., *Johns Hopkins Hosp. Bull.*, Nov., 1927.

An Address

ON

THE EVOLUTION OF CLINICAL PULMONARY TUBERCULOSIS AND ITS EARLY DIAGNOSIS*

By F. M. Pottenger, M.D.

Monrovia, Cal.

IN order to attain the two chief aims of medicine as they affect the problems of tuberculosis—the prevention of infection and the cure of the disease when once established—it is necessary for us to understand the life history of the disease, when and how the bacilli enter the body, whence they come, and the effects produced by them from the time of their implantation until they are either destroyed or rendered harmless; or, until they overcome the host.

The Evolution of Specific Defense

It is now generally conceded that the first implantation of bacilli in the human body usually takes place in the early years of life; that the two sources of infection are some human being or some animal which is afflicted with open tuberculosis is also conceded; but that the chief source of human tuberculosis in man is man is also quite well established. Whether the bacilli enter mainly by way of the air passages or by the digestive tract is still a moot question, for, regardless of the way they enter the body they usually find lodgment in the pulmonary tissues.

In the evolution of pulmonary tuberculosis the primary focus is of first importance, for the nature of the process depends largely upon the age of the individual when this infection occurs, and the numbers of bacilli making up the infecting dose. All else being equal, the younger the child and the greater the number of infecting bacilli, the more prone is the host to succumb to the infection, either at once or from metastases later.

When bacilli enter the tissues for the first time certain changes take place at the scene of invasion. The fixed cells proliferate and form epithelioid cells. This is attended by a gathering of leucocytes. This grouping of cells about the bacilli forms the tubercle. By this reaction the body cells attempt to destroy the invading bacilli, but failing this, to limit the infection to the point of invasion. There is nothing specific, nor is there anything inflammatory about this early reaction of the body toward bacilli, this tubercle formation. It simply represents the reaction of the body towards foreign substances which are insoluble. The same enveloping capsule would be thrown around any other particle of matter foreign to the organism.

But soon the condition changes. A secondary process, a specific protective mechanism, is called into play in the case of tuberculosis, which shows as a hypersensitivity of the body cells, and thereafter dominates every reaction which takes place between bacilli and host. The im-

* Abstract of address given before the St. Louis Medical Society under the auspices of the Trudeau Club, St. Louis, May 31, 1927.

munity which is established unfortunately is only relative. It differs in different persons, but is strengthened by all succeeding infections which the host is able to withstand.

The particular specific reacting power of the body cells of an individual infected by tuberculosis was designated "allergy" by von Pirquet, and is usually so called. It differs from the primary reaction of the body cells in the formation of tubercle in that it is primarily inflammatory and exudative in character. Tubercles may or may not form as a part of the picture.

Frequently, re-inoculations take place in individuals who have had their immunity established by previous infection or infections. These may be caused either by bacilli entering the body from without, or by those escaping from previously existing foci. Each re-inoculation successfully combated increases the pre-existing immunity. Immunity, on the other hand, is lowered by severe tuberculous infections and by conditions of stress, such as those brought about by bad living conditions, overwork, pregnancy and infections like measles, scarlet fever, and influenza.

When an infection is once implanted in the tissues, whether it shall remain localized or not depends much upon the numbers of bacilli causing the infection, the age of the individual, the state of his resistance at the time implantation occurs, and the physical and psychical condition under which he lives. We have no way of following the succession of events from the primary implantation to the development of clinical tuberculosis in man. There are many gaps that we wish we could fill. We, however, can draw fairly accurate analogies from animal experiment, and from the studies made on large groups of children subjected to the tuberculin test, and upon whom physical and x-ray examinations have been made and repeated from time to time.

The gap between the first infection and the appearance of clinical tuberculosis is most likely a time when repeated re-infections occur, most of which are due to few bacilli, hence unable to cause sufficient disturbance in the patient's well-being to make him aware of their presence, and yet, sufficient to stimulate his mechanism of specific defense and raise his immunity. Whether these are mostly exogenous, as Opie believes, or extensions from foci previously existing in the body, as we have long believed, makes no difference as far as the end result is concerned; but does make a great difference as far as our measures for prevention of the disease are concerned.

The Development of Clinical Tuberculosis

The appearance of symptoms is an individual matter, depending, on the one hand, on the virulence of the infecting bacilli, and, on the other, on the particular physiological equilibrium possessed by the person who harbours the infection. In one, with an unstable nervous system, whether from psychical or physical cause, a slight lesion may produce sufficient impression to overcome his physiological balance and cause symptoms, while a much more extensive and more active process will be borne by another with complete ignorance of its existence. Whenever an active infection is found, however, whether it be by accidental examination, or because of the presence of symptoms, a programme sufficient to meet the requirements of the case must be instituted. Such a programme in case of the person without symptoms may be simple, but it must be adequate to prevent spreading and to insure healing. It must consist of measures of rest, nutritious food and hygienic living, carried out until the patient's immunity reactions are heightened sufficiently to bring about healing. In case of the patient whose physiological balance is disturbed to the point of producing symptoms, more stringent measures must be instituted; but here, too, the test of the measures suggested is that they be sufficient to restore compensation to his disturbed balance and maintain it until his immunity reactions are sufficient to induce healing.

The period between the time when the first implantation of bacilli takes place in the body, usually in childhood, and the time when the first symptoms of clinical tuberculosis manifest themselves, is a variable one. It may be very short, only long enough for the bacilli to become implanted; or, it may be years. The length of this period is of the greatest importance, and the succession of events which take place during it determines largely the nature of the succeeding developments.

If infection is followed immediately by symptoms of disease the process is an acute one and usually destroys the patient. This is what hap-

pens almost without exception during the first few months of life, and is quite generally true up until the second or third year of life. If, on the other hand, the primary focus becomes quiescent or heals, then the individual's specific resistance is raised so that thereafter he can withstand much larger doses of bacilli without infection; and in case infection does take place, it either proves to be abortive, or leads to chronic tuberculosis.

The Incidence of Tuberculosis Among Children

Large groups of children have been carefully examined by various agencies to ascertain the frequency with which tuberculosis exists. Two excellent reports have been made recently by Myers and Rathbun. Myers, at Lymanhurst examined 4,500 children, of whom 2,275 reacted to the tuberculin test, giving a percentage of about 50 as harbouring infection. Rathbun reports that on making roentgenograms alone of the school children of Chautauqua County, New York, he was able to pick out about 3 or 4 per cent who were suffering from active tuberculosis. It is quite probable that these two reports give us a fair picture, on the one hand, of the incidence of infection in a large American city like Minneapolis, and, on the other, of the amount of active disease in the country districts.

The Development of Adult Tuberculosis

A small percentage of children die from some acute form of tuberculosis, such as miliary disease and meningitis, as a result of primary infection. According to Aschoff, about one-third of first infections heal and are not followed by re-inoculations later. Many also survive succeeding infections, without even being aware of their presence. On the other hand, there is quite a percentage of the human race which manifests symptoms of active tuberculosis some time during life. Inasmuch as the disease nearly always assumes a chronic course except during the tender years of early childhood, we assume that the infection causing active disease takes place in a body which is resistant to bacillary aggression. The only means of producing a degree of resistance that is able to convert an acute tuberculosis into a chronic one is a previous immunization resulting from infection. Clinical observation then warrants the assumption that nearly all adult tuberculosis results from an infection with such a relatively small number of bacilli that the host's specific immunizing mechanism is rendered competent before serious spread occurs; or takes place in a host previously immunized. Since von Pirquet's studies on vaccination and re-vaccination, students of tuberculosis have been of the opinion that the latter suggestion offers a satisfactory explanation of the problems associated with the development of chronic tuberculosis.

Since there is a lapse of time between primary infection and clinical disease, it is important to understand that any one may have primary infection, and also that any one may have clinical tuberculosis. No one is too young or too old, too weak or too strong, to have infection. The immunity which develops as a result of infections is only a relative one, yet it is at times very high; but never so high but that the proper number of bacilli, if properly imbedded in the tissues at the right time, would be not able to cause re-infection. This fact is of extreme clinical importance, for it puts physicians on their guard against surprises. They should approach the subject of tuberculosis with the knowledge that, while the disease is most apt to affect the weak, it may also be found in the strong and robust. It should be looked for at all ages and under all conditions. I personally have found active tuberculosis in children a few months old and in five adults above 80 years of age, one 89. I have also seen it in individuals weighing 250 pounds.

Symptom-Complex of Active Tuberculosis

It is especially important for all practitioners of medicine to have in mind the picture which is more or less characteristic of the body's reaction to early tuberculosis. Naturally such a picture can not be definite. It is changeable; in fact, from day to day and week to week, it may be moving; and like all moving pictures the composition and the detail depends on the one who plays the stellar role—the patient.

The picture presented by early active tuberculosis is modified by several important factors, such as, the number of the bacilli producing the disease process; the extent of the lesion; the absence of allergy as in primary infection, and the degree of allergy present in the case of re-infections at the time the inoculation takes place. These factors determine the manner in

which the tissues will react and the symptoms which will manifest themselves; but they are modified in practice by the age of the patient, for individuals react differently at different age periods; and by the physiological stability of the patient, for one patient will react with symptoms to a very small stimulus while another will withstand a much greater one and maintain perfect functioning balance. Likewise, an individual in a state of low physical vigor will show symptoms more readily than the strong.

Active tuberculosis, however, no matter when it appears, commands the respect and challenges the skill of the physician, if healing with restoration to usefulness is to be attained.

I like to think of the symptom-complex present in any disease as being the manner in which the individual is able to maintain his bodily functions in spite of the pathological condition, rather than an entity caused by the disease. This conception is based on the fact that most symptoms are departures from normal function. Even biological changes represent newly acquired or altered function of cells, which vary with the individual's own particular physiological makeup.

The two great problems in dealing with clinical tuberculosis are: first, to secure an early diagnosis, and, second, to institute immediately an adequate treatment. An adequate treatment calls not only for medical knowledge and skill in regard to the tuberculosis, but also an equal skill in helping the patient to meet the many problems of a domestic, social and business nature which are thrown upon him by the disease. No matter what the many problems may be however, they can be best minimized by an early diagnosis.

Unfortunately, we have no symptoms which always mean active tuberculosis. The presence of bacilli and a positive tuberculin test show that infection is present, but do not of themselves give information as to its activity; for all tuberculosis, unless completely healed, and during an unknown period after healing has occurred until the sensitivity of the dermal cells has vanished, will react to tuberculin and, certain old walled-off cavities and sinuses will continue to shed a few bacilli now and then, although the disease has ceased to be progressive. Nevertheless, a history taken with pains to bring out the essential facts, when carefully analyzed, will indicate the probable presence or absence of tuberculous disease in a very large percentage of cases, probably not far from ninety. It is largely the borderline cases that give trouble in diagnosis.

Etiological Classification of the Symptoms Facilitates Diagnosis

The classification of symptoms according to their etiology is as follows: Table I—Group I, *Constitutional,* or *toxic;* Group II, *Reflex;* Group III, *Local,* or those due to the tuberculous process *per se.* This to my mind simplifies diagnosis very much.

This classification emphasizes that general or toxic symptoms are of no differential value in themselves, because the toxins from any infection, or toxic products of whatever nature, produce the same group of symptoms, varying, of course, according to the nature of the infection or toxic agent and with the individual patient. It is furthermore evident that much the same group of symptoms is found in various conditions of disturbed equilibrium, or instability of the nervous, endocrine and psychical

TABLE I.

Group I *Symptoms due to toxæmia and other causes acting generally*	*Group II* *Symptoms due to reflex causes*	*Group III* *Symptoms due to the tuberculous process per se*
Malaise.	Hoarseness.	Spitting of blood.
Lack of endurance.	Tickling in larynx.	Sputum.
Loss of strength.	Cough.	Frequent and protracted colds.
Nerve instability.	Digestive disturbances.	Pleurisy (tuberculosis of pleura).
Digestive disturbances. (hypomotility and hyposecretion).	(hypermotility and hypersecretion), which may result in loss of weight.	
Metabolic disturbances resulting in loss of weight.	Circulatory disturbances.	
Increased pulse rate.	Chest and shoulder pains.	
Night sweats.	Flushing of face.	
Temperature.	Spasm of muscles of shoulder girdle, crura and central tendon of the diaphragm.	
Blood changes.	Diminished motion of the affected side.	

systems. This classification does emphasize, however, their very great importance when associated with certain of the symptoms found in Group II, particularly cough and the spasticity of the muscles of the shoulder-girdle, together with limited motion of the thorax on the affected side caused by the reflexly contracted muscles of the shoulder-girdle above, particularly the scaleni, and the central tendon and crura of the diaphragm below; and, further, when one or more of the symptoms of Group III are present.

Symptoms of Group II represent altered function in other organs which are caused by stimuli arising in the pathological process in the lung. Those expressed partly or wholly in the larynx, such as laryngeal irritation and cough, while they may be caused by stimuli from certain organs other than the lungs, particularly those of the upper respiratory tract, and also by diseases other than tuberculosis involving the lungs, yet demand close attention; and, if associated with symptoms of Group III alone, or particularly with those of Group I and III, are very suggestive of a pulmonary tuberculosis. The most suggestive, however, are limited motion of the affected side, and the spasticity of the muscles of the shoulder-girdle; for, if the motor nerves causing this spasticity and limited action are traced centralward, it will be found that they connect in the cord with the afferent nerves which carry the stimuli centralward from the lung, and, further, that they do not commonly form reflexes with impulses from other important organs. Therefore, this pulmonary motor reflex, when combined with other symptoms, is of the greatest value in suggesting pulmonary inflammation, usually tuberculosis.

Symptoms belonging to Group III are the most definitely localizing of all, for they result from activity in the tuberculous process in the lung or enveloping pleura. But even these will be accompanied by doubt occasionally. Blood-spitting and pleurisy can at times be caused by non-tuberculous disease; and, tuberculous bronchitis may at times fail to show its true nature by the presence of bacilli. Consequently, symptoms of one group are rendered more valuable as evidence of pulmonary tuberculosis if they are accompanied by symptoms belonging to other groups.

I wish to emphasize once more the fact that inflammation in the lung stands out almost alone in utilizing the nerve paths through the cervical segments of the cord in the production of spasm of skeletal muscles; so, when this is present in conjunction with other symptoms it adds greatly to the probability of a pulmonary tuberculosis. The reason that it points to tuberculosis as being the cause, rather than to other pulmonary infections, is because tuberculosis, being a lesion of the parenchyma, is usually more widespread than the others and nearly always calls out the pulmonary motor reflex, while other lesions show it more rarely and usually only to a very slight extent.

Diagnosis of Early Active Tuberculosis

When the presenting symptoms are analyzed and considered in their relationship to each other, most cases of tuberculosis will be readily suspected. Once suspected, physical examination, x-ray, and examination of the sputum, will clear up the doubt in nearly all instances. The difficult cases may require study and observation over a period of several days or weeks. Where such delay is encountered, the patient should be given advice regarding his mode of life and activities so that he will not suffer harm as a result of the delay.

Some of the causes of error in diagnosis may be considered with advantage. Those who are not accustomed to searching stethoscopically for the fine changes produced in the lung by an early lesion had better put more reliance in other methods, such as the clinical history, sputum examination and x-ray; yet in doing this they must understand that these methods are also attended by a considerable degree of error. The custom of taking a single expectoration and examining it by ordinary methods often fails to reveal bacilli though present. In early suspicious cases all sputum raised, no matter where the patient thinks it comes from, should be saved and treated by one of the concentration methods. If samples are collected for 24, 48 and 72 hours and then examined by one of the refined techniques, which should be available in laboratories in all large cities, the presence or absence of bacilli can be determined with a high degree of accuracy. But, one must also remember that the absence of bacilli does not mean the absence of tuberculosis.

XUM

X-ray examinations are also attended with a considerable degree of error, and the more so when the x-ray is used by men who are not particularly skilled in making chest plates. The x-ray does not show everything. A considerable degree of tuberculosis may be present and not show on the plate. On the other hand, carefully taken pictures, particularly if they be taken both dorso-ventrally and ventro-dorsally, may be depended upon to eliminate a source of error met in plates taken only in one direction.

MATERNAL MORTALITY IN CANADA*

By Helen MacMurchy, M.D.

Ottawa

At the meeting of the first Conference on Medical Services in Canada, held at Ottawa in December, 1924, a resolution was passed asking the Minister of Health of Canada to make a comprehensive enquiry into maternal mortality in this country . During the next six months, under the direction of the Deputy Minister, the help and co-operation of the medical profession, the Provincial authorities, and the Dominion Bureau of Statistics were obtained, and it was agreed that this enquiry should be made for the year immediately following, from Dominion Day, 1925, to Dominion Day, 1926.

As a result of this co-operation, there are now on file about 11,000 official returns, records of the deaths of all women between 15 and 50 years of age who died in that year, together with the name and address of the physician or other person signing the death certificate. These returns were examined on receipt. The maternal deaths were found to be 1,202 in number. This figure corresponds closely with the records of the Dominion Bureau of Statistics for the year 1925, and with the average annual maternity mortality from 1921-1925 which is 1,221.

A letter, enclosing a white form giving an outline for a brief medical history of each of these 1,202 patients, was then mailed to the physician signing the death certificate, with a request that the history be filled out and returned. Answers were received from about 92 per cent and it is chiefly upon the information thus obtained that the present report is made.

In addition to these 1,202 there remained about 9,798 of the 11,000 official returns. Of these it was evident that 6,998 did not belong to the present enquiry, and they were therefore laid aside. Finally, there remained about 2,800 returns which might or might not belong to the scope of this enquiry, the cause of death being given as hæmorrhage, septicæmia, embolus, etc. To the physicians signing these 2,800 returns a similar letter of request was sent enclosing a red form giving an outline for a brief medical history. The red form differed from the white form in the addition of one question—"Was the patient pregnant at any time during the year preceding her death?" If this question was answered "No", or if the next question—"Had the pregnancy any influence whatever on the fatality?" was answered "No", then these returns were also laid aside. But in 330 cases both these questions were answered "Yes", and the medical history was filled out accordingly.

The Answer of the Medical Profession

Our maternal mortality for the 59th year of Confederation is therefore 1,202 plus 330, or 1,532, a rate of approximately 6 per 1,000 living births. That is the answer of the medical profession to the question—"What is our maternal mortality?"

It has not yet been possible to prepare for publication all the material contained in these histories, but a preliminary tabulation has been made. The central topic of the enquiry is—Why did the mother die and how might her death have been prevented?

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*Read at the annual meeting of the Canadian Medical Association, Toronto, June 16, 1927.

Previous Medical History

The previous medical history of these 1,532 mothers shows that in 727 cases their health was not good. In addition, the statement is made in 68 cases that the mother was very poor and destitute. Total: 795 cases or over half of the total maternal mortality.

General health poor or bad	153
Cardiac disease	226
Influenza and pneumonia	132
Tuberculosis	96
Exhausted with care of home and children	67
Exhausted for want of sleep and rest	27
Exhausted from too frequent pregnancies (such as 5 children in 6 years)	26
Total	727

Cardiac Disease.—In 95 cases pre-existing cardiac disease was mentioned as lessening the mother's chance of life; and in 190 cases, including 59 of the above, cardiac disease was given as a cause of death. Total: 226 cases. The following letter of advice was received from Dr. J. A. Oille.

"Cases of mitral stenosis should not marry without being warned of the danger of pregnancy, and if they are already married should not be allowed to become pregnant without being told that they run considerable risk of making the heart worse.

"There are three ways in which the heart is made worse by pregnancy. (1) The increased strain thrown upon the circulation by the pregnancy itself on account of the added circulation and on account of the increased abdominal pressure, interfering with the descent of the diaphragm. (2) The strain of labour itself, which in the case of mitral stenosis occasionally is fatal. (3) The increased strain thrown upon the heart by the increased work necessitated by the care of the child afterwards.

"In a case with mitral stenosis or any cardiac disease in which myocardial failure (broken compensation) occurs, the patient should immediately be put to bed and kept there under observation for a few weeks. If there is no improvement the pregnancy should be terminated. If there is improvement the patient should be carried on until the fœtus is viable, and then a Cæsarean section done. A Cæsarean section under favourable circumstances is a far less strain on the heart than the average labour. Before the section is done the patient and her husband should be consulted as to the advisability of inducing sterility by section of the tubes. If at the time of the termination of pregnancy there is myocardial failure with passive congestion, the patient should be kept in bed until the circulation is normal, and then for a further period of four weeks, in order that the heart may regain some reserve. Following this the ordinary advice should be given that is given in cases with chronic heart disease."

Tuberculosis.—The number of these mothers who were reported as having tuberculosis was 96. A letter of advice from Dr. D. A. Stewart, Superintendent, Manitoba Sanatorium contains the following:—

"There is no doubt that pregnancy and childbearing constitute for a tuberculous woman a very great risk, and that latent tuberculosis frequently becomes activated by the cycle of pregnancy and maternity. The strain of childbirth may not have been enough recognized. The childbearing woman may not have been enough safeguarded. This extra burden may not have been enough provided for. Under ordinary conditions, where the woman is the housewife, perhaps with duties even outside the home, with one child scarcely on its feet before another is in the mother's arms, with bad housing and, perhaps, some special cause of worry or discouragement, with the care of fretful and sick children—is it difficult to understand a breaking down of resistance and a lighting up of even a deeply buried focus (such as may almost be considered universal) into active disease? After early adult life has been reached the cause of tuberculosis is not the tubercle bacillus but overstrain. An intelligent application of this truth would safeguard the health and life of many an over-burdened childbearing woman."[1]

Too Frequent Pregnancies.—In 19 cases the physician stated that previous pregnancies had been too frequent, and at too short intervals, such as "five children in 6 years". In 7 cases it was stated that pregnancy had been forbidden but the advice had been disregarded. Nearly all of these 795 deaths might have been prevented by proper pre-natal care, home care, nursing care, and medical care.

Special Causes of Death

Sepsis was the cause of death in 418 cases, or 27 per cent. It seems not unlikely that a proportion of the 8 per cent of cases in which no history was obtainable belong here. Probably about 33 per cent of maternal deaths are due to sepsis. These deaths are preventable. On this subject Sir Ewen Maclean[2] writes as follows:—

"Puerperal mortality is an international subject, and one which should engage the urgent attention of the League of Nations in even greater degree than it appears yet to have done. Puerperal sepsis is by far its greatest single factor. The outstanding fact is that, for some reason or group of reasons not yet fully demonstrated, obstetrics throughout the known world has not shared in like degree with other departments of medicine in the benefits conferred on mankind by the researches of Pasteur and Lister. The real concern of the profession is aroused, and that is all to the good, but more significant still is the portent that the public is asking, and asking pertinently, if this calamitous disease is preventable, why is it not prevented?"

Hæmorrhage, Toxæmias, Dystocia.—Hæmorrhage caused 357 deaths, 23 per cent. Toxæmias of pregnancy caused 344 deaths, 22 per cent. Long and hard labour caused 87 deaths, 5 per cent. A total of 788. Nearly all of these deaths

could have been prevented by proper pre-natal care.

Toxæmias of Pregnancy. — Pernicious vomiting was the cause of death in 47 cases; phlebitis is mentioned as a cause in 22 cases; nephritis in 80 cases. Eclampsia was the cause of death in 195 cases. The total number of deaths from pernicious vomiting and eclampsia was 242, or 16 per cent of the total. It would appear probable that accidental hæmorrhage and other grave conditions should be included with the toxæmias of pregnancy. On this subject Dr. F. J. Browne,[3] Royal Maternity Hospital, Edinburgh, writes as follows:—

> "Observation of clinical cases has shown that chronic nephritis was often a forerunner of accidental hæmorrhage, and seemed to predispose to it. Experimental work based on this relation has developed evidence that brings accidental hæmorrhage definitely into the category of the toxæmias of pregnancy."

Dr. James Young states that:—

> "There is now much evidence for the view that the late pregnancy toxæmias, whether eclamptic or nephritic, have a similar origin in the diseased placenta, and that kidney damage in such cases is secondary and often aggravated by successive toxic pregnancies. This is supported by my own investigations and by those of others, which indicate that chronic nephritis might succeed even one eclamptic attack."

Every ante-natal clinic shows by its work that eclampsia is a preventable disease. The investigations of the Joint Committee of the Medical Research Council and the Obstetrical and Gynæcological Section of the Royal Society of Medicine indicate that the number of cases in which eclampsia comes "as a bolt from the blue" without any warning signs is very small.

In Toronto General Hospital, Burnside Wards,* and elsewhere, salt has been omitted from the diet of pre-eclamptic patients. Over one hundred patients have been greatly benefited by this procedure, which allows carbohydrate and other foods in sufficient quantity. It is therefore recommended as a preventive measure that all pregnant women should, in the last half of pregnancy, add no salt to their food at the table, and should take a salt-free diet for one week out of each month.

In 87 cases it was stated that the labour was long and hard, leading to exhaustion and shock; in 87 cases the cause of death was given as embolus; in 63 cases shock was given as the cause of death. Ectopic pregnancy occurred in 33 cases.

Of the total number of cases 349 were primiparæ and 963 were multiparæ. In 110 cases the death of the patient occurred before labour. In 57 cases the death occurred in labour. Forceps were used in 289 cases, or 19 per cent of the total number. On this subject Prof. W. W. Chipman[5] writes as follows:—

> "Still we hear the boast of the advantage of the routine abrogation of the second stage by a version and extraction; or by the use of the so-called prophylactic forceps. In a word, the boast of a vicarious labour on the part of the obstetrician. A dangerous practice this, and a still more dangerous teaching, for in unskilled hands such measures are inevitably disastrous, and they may be even criminal. In the practice of obstetrics, nothing can be worse than an untimely, a premature, interference."

Fifty-six letters received mention hurry on the part of the physician as the reason given for the use of forceps; other letters state that instruments were employed by the wish of the patient and her friends.

Pituitrin was used in 327 cases, 21 per cent, and in three of these it is recorded that rupture of the uterus occurred.

Pituitrin was used:—	
Before labour in	5
In first stage in	9
In second stage in	123
In third stage in	32
Post partum in	50
During the operation of Cæsarean section in	11
	230

In the remaining 97 cases the time of using pituitrin was not stated.

MEDICAL ATTENDANCE AND POST-PARTUM CARE

No doctor was in attendance at 237 cases, or 15 per cent of the whole. This number includes 48, or 3 per cent of the whole, in which a midwife, nearly always untrained, was in attendance, and in some of these 48 cases the midwife was directly responsible for the death. The lack of medical care in the outposts is a serious matter and is at present under consideration by this association. There can be no doubt that better provision for medical, hospital, nursing service and emergency domestic service would save the lives of many of our mothers. Much is being done, especially along the lines of hospital service, by the Red Cross and other organizations.

As a part of this enquiry it was ascertained

* Prof. W. B. Hendry, Dr. Van Wyck, Prof. Harding.

that in 1925 there were in Canada a total of 28,076 hospital beds and that of these 5,079 were available for maternity patients. In 1924, the total number of births which took place in these hospitals was 38,634.

Our total number of births in 1924 in Canada was over 244,000. Births in hospitals numbered 38,634 or 16 per cent of that number. But with over 5,000 hospital maternity beds we could accommodate, allowing 18 hospital days for each maternity patient and 20 patients to each bed, 100,000 births, which would be about 40 per cent of our total births. Should we not make more use of our hospital maternity beds?

Professional Nursing and Household Help.—The absence of proper post-partum care, especially of skilled nursing, or even of household help, was mentioned in 6 cases as the cause of death. In one of the letters received the physician made a tabular analysis of his last 200 cases as follows.

200 consecutive cases	*Nursed by a fully trained nurse either at home or in hospital*	*Nursed by a fairly competent but untrained practical nurse*	*Nursed by a relative, housekeeper or neighbour who did not claim to be a practical nurse*
Normal puerperium, after a normal labour	18	61	90 = 169
Normal puerperium after an abnormal labour (forceps, version or P. P. hæmorrhage)	4	10	3 = 17
Abnormal puerperium (mild form of short duration or femoral phlebitis) after a normal labour (recovery)		1	8 = 9
Abnormal puerperium after an abnormal labour (recovery)			3 = 3
Severe septicæmia after a normal labour			2 = 2 (One death)
	22	72	106 = 200

Pre-Natal Care

Finally, the histories show that out of these 1,532, 230 had pre-natal care and 1,302 had not. In 128 cases the doctor was not called till labour had actually begun. Out of the 230 cases where pre-natal care was given, there were 40 cases where the mother was responsible for the failure of pre-natal care. She came once or twice and did not return, or else she did not follow the doctor's advice. She did not understand.

A letter from one of our French colleagues, gives the reason:—

"Je suis médecin de campagne. Il est bien triste de la dire, mais nous voyons toujours les femmes juste au moment de l'accouchement. Les femmes ne veulent pas se faire examiner avant cette date. Pas d'analyse d'urine; rien de tout cela. Voila le grand mal."

Prof. B. P. Watson states that:—

"It has long been recognized that most of the complications arising in pregnancy, in labour, and after labour are preventable. If they are detected early they can be prevented. In the case of most of them it is only when they have progressed, unrecognized and untreated, that they are dangerous."

The economic factor comes into this question. It is not unusual for us to receive letters from parents who have not been able to pay the doctor's account for services rendered at the last child's birth, and are ashamed to ask him to come again, asking "What are we to do?" We must educate the mother about the need of pre-natal care. The late Prof. J. W. Ballantyne of Edinburgh began this movement in 1901.

We have not made much progress in these 25 years. The mother never before sent for the doctor till the birth was near. Why should she now? She does not like to be examined and questioned. We must meet her half way. Doctors and nurses must be able and willing to give advice acceptably and mothers must be ready and anxious to receive it. Many doctors say they believe in pre-natal care, but their actions speak louder than their words, and it is well-known that some patients who have been persuaded, often with difficulty, to consult a doctor for pre-natal care, have been dismissed by the doctor with scant attention. Letters of advice from physicians say:—

"Doctors do not take these cases seriously enough."

"Maternal life is held in too light esteem."

"Too little attention is given to pregnant women."

It is essential to get the husband's understanding and help in pre-natal work. We shall never really succeed till we do, and then we shall have gone a long way towards educating the general public.

Matters of Vital Importance

His Majesty the King, in an address at the opening of the new House of the British Medical Association in 1925, said: "The welfare of my people at home and throughout the Empire depends largely upon an efficient and well organized health organization. The protection of maternity and the care of the child, are matters of vital importance."

References

1. Stewart, D. A., Paper read before the Canadian Tuberculosis Association, 1917.
2. Maclean, Sir Ewen, *Canad. M. Ass. J.*, Jan., 1927, xvii, 1.
3. Browne, F. J., Report of the Medical Research Council, 1925-26.
4. Young, James, *Lancet*, 1927, v, 2.
5. Chipman, W. W., *Canad. M. Ass. J.*, June, 1926, xvi, 681.

THE EXAMINATION OF THE NERVOUS SYSTEM WITH INTERPRETATION OF FINDINGS*

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To cover completely in the allotted time the field which the subject indicates would be like putting anatomy into a nut-shell. The impossibility of either is obvious and I would like, therefore, to direct your attention to a few of the commoner and more important conditions which may be revealed by a routine examination of the nervous system. In approaching any neurological case there must be kept in mind the specific goal of determining in the first place where the lesion is, and secondly, what the lesion is, or in other words the anatomical and pathological diagnosis. The method of procedure must be specific and systematic. It matters little what particular scheme is adopted provided it is comprehensive in character and is conducted without neglect of detail.

Every routine investigation should comprise three main divisions: the complaint; the history; and the physical examination.

The *Complaint* is a simple statement by the patient of his disability as he feels it and not, as so frequently happens, an opinion of his own or someone else.

The *History* includes a concise narrative of the condition complained of, as well as of facts concerning immediate relations, previous health, or personal propensities. In all of this, the unfolding of the tale must be guided by judicious questions leading to the revelation of relevant facts. A history well taken will often elucidate many points, which will illuminate an erstwhile obscure path to a correct diagnosis. In this connection the duration of the onset of symptoms might be mentioned as an example. It may be ascertained that the condition occurred suddenly, rapidly, gradually, or slowly, or, in other words, in seconds, minutes, hours, days, months or years. Thus it may be interpreted that if the onset is in seconds an embolus is probably indicated; if minutes, hæmorrhage; if hours, thrombosis; if days, inflammation; if months, tumour; and if years, degeneration. Another important detail, especially in a traumatized patient, is the duration of unconsciousness, since the longer the latter, the more severe has been the injury to the brain.

The *Physical Examination* is by far the most important part of the investigation. Its success depends upon the methodical detail with which it is undertaken. It is true that there are certain conditions, such as paralysis agitans or cretinism, which may be diagnosed at a glance. One either recognizes them immediately or one does not, and if the latter is the case it is problematical if a protracted examination will ma-

* Read at the annual meeting of the Canadian Medical Association, Toronto, June 16, 1927.

terially assist. In the main, however, success is proportionate to the capacity for minute detail and to the correct interpretation of the observations made. Consequently, the best plan is to begin with the patient's mentality, because his intelligence, comprehension, and power of attention must be known in order to estimate correctly the value of his subsequent replies. Next in order, one investigates the powers of speech and articulation, the function of the cranial nerves, sensation, motor power, gait, reflexes, contour of the skull and vertebral column, in which the x-ray is a valuable adjunct, and, finally, the chemical and microscopical examination of the cerebro-spinal fluid.

Fortunately, the time at my disposal is sufficiently brief to prevent my going into the details of these various functions, but a few of the commoner findings may be profitably discussed.

Speech and Articulation

There is a distinct difference between speech and articulation. To quote Sir Jas. Stewart, "Speech is the power of using certain recognized symbols either spoken or written in such a way that we may communicate ideas to our fellow men. Articulation is the ability to perform the co-ordinated muscular movements necessary for the production of the consonants and vowels which go to form syllables and words. The former is a cortical function, the latter mainly bulbar." Loss of articular speech may be due to defects in the intellectual powers, as in congenital idiots, acquired dementia, coma, stupor, or hysteria; defects in the motor or sensory speech centres, as in vascular lesions and tumours, the so-called aphasias, and in the peripheral organs of articulation.

Aphasia is a defect in using or understanding written or spoken words, due to lesions in the speech centres in which there are motor and sensory components. The motor centres, two in number, for the expression of words either vocally or in writing, are situated in the left inferior frontal, or Broca's convolution. The sensory are also two in number; one for the comprehension of spoken words—the auditory centre—is located in the first temporal convolution; while the other—the visual centre—for the understanding of written symbols, is in the angular gyrus.

Lesions in one or more of these centres, or in their intercommunicating fibres, give rise to a multiplicity of symptoms. For example, a patient may be unable to understand spoken words but can read, speak or write normally, indicating a lesion of the auditory centre or pure auditory aphasia. Again, there may be visual aphasia—word blindness or alexia—in which written words may appear like Chinese characters, yet spoken words are understood, speech is normal, and writing is possible, in that copying may be done, although not understood. In motor aphasia, the patient is unable to write—agraphia—a condition which rarely occurs in pure form, and is also unable to speak intelligibly. The degree of motor aphasia varies from the slurring of syllables or missing a word to a pure jargon or an inapposite repetition of one or two words. I recall one patient who constantly repeated the more or less meaningless, though sometimes useful, words "more wine." The vocabulary of another was restricted to the two words "gaol" and "whiskey" with both of which in health he had had a more or less prolonged acquaintance. The motor aphasic is never entirely wordless: complete mutism is strongly indicative of hysteria.

Conditions producing dysarthria may be divided into three classes: infra-nuclear, articulative ataxia, and supra-nuclear or cortico-bulbar affections. The infra-nuclear group consists of those conditions in which the motor nerves or nuclei supplying the articulate muscles are paralyzed. Thus unilateral hypoglossal paralysis, facial palsy, paresis of the palate from diphtheria or other toxins, and bulbar palsy, would be examples of this condition. Articulative ataxia is caused by such diseases as disseminated sclerosis, Friedreich's ataxia, or acute cerebellar lesions such as encephalitis lethargica or lacerated wounds. In the supra-nuclear group, the upper cortico-nuclear neurones are affected and where a patient presents symptoms of this type one suspects delirium, alcoholic or other intoxication, or general paresis of the insane.

Ocular Manifestations

In the systematic examination of the cranial nerves the investigation of ocular abnormalities takes a premier position. One half of the

nerves arising within the skull are distributed in whole or in part to the organs of vision. Anæsthesia or paralysis of the lids would indicate a lesion of the fifth or seventh nerve of the ipso-lateral side or of the contra-lateral cerebrum. The absence of pupillary reactions would suggest amaurosis, adhesions of the iris, or the physiological action of certain drugs. If, on the other hand, the pupil is inactive to light but contracts to accommodation, the so-called Argyll-Robertson pupil, one recognizes a lesion of the ciliary ganglion, almost certainly of luetic origin. This sign occurs in 80 to 90 per cent of tabetic cases. An ill sustained contraction to light, or hippus, is a common sign in hysteria. Contracted, irregular, unequal, or eccentric pupils strongly suggest a previous infection by the spirochæta pallida, while a slight ptosis is often an early sign of tabes or hysteria. In the latter it is frequently accompanied by a marked blepharospasm.

Paralyses of ocular muscles are significant of nerve lesions, especially in fractures of the skull, cerebro-spinal meningitis, and encephalitis lethargica. Inability to rotate the eyeball inwards, downwards and inwards, or outwards, would follow a lesion of the third, fourth, or sixth nerves respectively, while total ophthalmoplegia would result from involvement of all three nerves by a lesion in the pons.

Nystagmus is a rapid rhythmic oscillation of the eyeballs in a horizontal or vertical direction and exaggerated by extreme deviation. It is present in disseminated sclerosis, Friedreich's ataxia, and cerebellar disease. It is also found in miners and compositors, as well as in those eyes where vision is defective, and in albinos. Varieties of labyrinthine or vestibular nystagmus may be experimentally produced in healthy subjects by syringing the external ear with water at different temperatures. Variations in the characteristic reactions would signify abnormalities in the internal ear.

Provided the light transmitting mechanism of the eye be intact, impaired vision may be due to a lesion of the occipital poles, optic tracts, or optic nerves. Monocular amblyopia would signify impairment of the optic nerve on the affected side from basilar fractures, penetrating wounds, localized inflammation, or pressure from tumours, hæmorrhage or abscess in the orbit. When both eyes are affected a toxic neuritis from tobacco, quinine, or methyl alcohol should be suspected. Hemianopsia is incident to a lesion of the optic tract or occipital pole, on the side opposite to that of the blind field, but bi-nasal hemianopsia indicates a pituitary growth.

The ophthalmoscope, without the use of which no examination is complete, gives exceedingly valuable information. Pale, narrow, wavy, and sometimes irregular retinal arteries are characteristic of vascular degeneration, from which may be deduced the condition of the intra-cranial vessels. Papillary œdema or choked disc, together with distended retinal veins, is evidence of intra-cranial pressure from tumour or abscess or from œdema or hæmorrhage following trauma. Finally, primary optic atrophy occurs in more than half the cases of tabes dorsalis; it is not uncommon in disseminated sclerosis and general paresis of the insane, and is a constant sign in amaurotic family idiocy.

Sensation

No phase of a neurological examination requires more skill than that of the sensory nerves. Of necessity it must frequently be protracted, and requires not only much patience but a great deal of tact, since success is entirely dependent upon the exactitude of the patient's replies. In comatose patients, some aphasics, dements, or idiots these are negative or useless; in hysterics or malingerers they are often misleading: even in the average patient their accuracy must be critically estimated. Hence it is important to have a correct knowledge of a patient's mentality prior to undertaking the investigation.

The various afferent impulses are divided into three kinds of sensibility, each of which follows an individual pathway from the periphery to the cerebral cortex. The first of these—deep sensibility—includes deep pressure, vibration sense, and sensations from muscles, tendons and joints. The fibres conducting these impulses traverse the peripheral nerve and enter the cord by the posterior root. They then ascend in the posterior column to the nucleus gracilis and nucleus cuneatus of the medulla where they cross to the opposite side and continue upwards through the pons, crura, optic thalamus,

and the internal capsule to the post-central gyrus of the cerebrum.

The second type, or protopathic, responds to all painful stimuli, pinching, pin-pricks, or faradism, and heat or cold, provided the temperature is above 45° C. or below 10° C. The path for these impulses enters the cord by the posterior root, traverses the grey matter of the posterior cornu, and immediately crosses to the opposite side via the anterior commissure and ascends in the lateral column.

Lastly, epicritic sensibility recognizes light touch, cutaneous localization, compass test, and finer differences in temperature, that is, warm and cool instead of hot and cold as in protopathic sensibility. The fibres of this group reach the posterior cornu in company with those of the other two. From the posterior horn, part ascend in the column of Goll along with the fibres of deep sensibility eventually to cross in the pons, but the majority cross immediately to the opposite side and ascend in the lateral columns. Both divisions unite in the pons and are conducted farther upward through the crura, optic thalamus, and internal capsule, to terminate in the cortex. Lesions of these pathways, whether within the brain, spinal cord or peripheral nerves, will cause sensory changes in the cutaneous areas supplied by the interrupted fibres. Thus, for example, an anæsthesia of the inner half of the fourth and the whole of the fifth finger, together with the adjacent portion of the hand, would signify complete involvement of the ulnar nerve. Total loss of sensibility in both lower limbs and a horizontal section of the trunk would indicate a total transverse lesion of the spinal cord at a segment corresponding to the level of the tactile deficiency. Cord lesions are for the most part produced by trauma, tumours, hæmorrhage, or inflammation, and may be irregular, oblique, or incomplete, creating corresponding variations in the cutaneous sensory symptoms from which the extent and site of the damage may be deciphered.

A good example of the diversification of these signs is seen in a lesion of one lateral half of the spinal cord which produces the well known Brown-Séquard syndrome. On the side of the lesion, besides the motor paralysis, with its attending extensor plantar response and exaggerated deep reflexes, there is a loss of deep sensibility and a diminution in the acuity of the sense of touch. On the opposite side there is no paralysis, but there is a loss of cutaneous sensation to pain and extremes of temperature as well as a partial loss of tactile sensibility.

Motor Power

Locomotion depends upon the ability to institute impulses and transmit them along recognized pathways, as well as on the contractibility of muscular tissue and the flexibility of joints. Efferent impulses originate in the precentral gyrus and traverse the internal capsule, crus cerebri, pons, and medulla. Here for the most part they decussate and descend in the lateral column of the cord on the opposite side. They leave that structure by way of the anterior horn and root for their various destinations in the muscles, through the peripheral nerves.

Destruction of any portion of this neurological highway will be manifest by a paralysis of those muscles whose lines of communication have been interrupted. A lesion of the cortex, unless very extensive, will produce only a monoplegia of the contra-lateral side, and if the cortical cells are incompletely destroyed only a paresis which is prone to be accompanied by a coarse spasmodic tremor — the Jacksonian seizure — with or without unconsciousness. If the lesion is in the internal capsule, the result, on account of its limited confines, will be a contra-lateral hemiplegia. A third nerve palsy on one side and an opposite-sided hemiplegia would indicate a lesion of the crus cerebri on the side of the ocular paralysis. This variety is known as Weber's syndrome. Lower down in the pyramidal tract a lesion of the pons gives rise to another type of paralysis. The third nerve escapes, but at the level of the seventh nerve the face is paralyzed on the same side as the lesion, while the limbs of the opposite side are affected. Symptoms caused by interruptions in the pathways of the spinal cord depend on the level of the damage. When it is below the medulla, a unilateral lesion causes a paresis of the ipsolateral instead of the contralateral side. Not only the motor but the sensory fibres are affected and the Brown-Séquard syndrome already referred to results. When the lesion is in the cervical region the upper as well as the

lower limbs are affected, but if it is below the cervical enlargement the arms escape. Muscles supplied by a peripheral nerve are paralyzed when that particular nerve is damaged.

The type of paralysis varies with the site of the lesion. The motor pathway is divided into an upper and lower motor neurone. The former, or cortico-spinal, includes that portion situated above the anterior horn, while the latter, or nucleo-muscular, embraces the anterior horn cells and all fibres distal to it. Lesions in the upper division give rise to a spastic paralysis with no muscular atrophy other than that of disuse, and no changes in electrical reactions. On the other hand, lower motor neurone palsies are flaccid with marked atrophy, absence of reflexes, and show the reaction of degeneration to electrical stimuli. In these latter, if the lesion is in the anterior horn or in the anterior root of the peripheral nerve there will be no alteration of sensibility, a typical example of which is poliomyelitis. It must be remembered that in severe upper motor neurone lesions the resulting paralysis, at first, may be of the flaccid type with complete loss of the deep reflexes, but spasticity with return of reflexes will develop within a few weeks.

Somewhat associated with muscular paralysis, especially in the course of an examination, and probably on account of their direct opposition, are tremors. Uncontrolled movements vary in type from a fine rhythmic oscillation, with a rate of 8-10 per second, to a coarse irregular athetosis. The finer variety includes those of toxic origin, such as alcohol, tobacco, and the subsultus tendinum of wasting fevers and exophthalmic goitre. In paralysis agitans, the tremor is coarser, chiefly of the hands and head, and can be temporarily controlled by concentrated effort. In contradistinction to this is the tremor of disseminated sclerosis, which is increased by voluntary endeavour. The coarser variety is seen in such conditions as chorea, habit spasm, Friedreich's ataxia, spasmus nutans, and infantile convulsions. Athetoid movements, which are extremely coarse, irregular and flail-like, are seen in Little's disease or old-standing hemiplegia, especially infantile hemiplegia, but only where the paralysis is incomplete and some slight voluntary power persists.

Gait

Much neurological information may be gleaned from observation of a patient's gait. In doing so it is advisable to have the lower limbs freely exposed and the feet bare, since the ingenuity of the shoemaker's craft may materially alter, in different people, the normal method of walking. Briefly, gaits may be classified as follows:

1. Spastic. The foot on the sound side scrapes along the ground describing a semicircle as the pelvis rotates around the head of the opposite femur. It is seen in lesions of the upper motor neurone type. In Little's disease both sides are involved, with marked contraction of the adductor muscles, producing the well-known scissors gait.

2. Flaccid. This variety is found in lower motor neurone lesions, and is consequently directly opposite to the spastic type. The limbs are loose and the feet flap along, being thrown forward by such muscles as are functioning and more or less flipped into position. It is seen in infantile paralysis, multiple neuritis, and physiologically sectioned peripheral nerves.

3. Ataxic. This is best described as staggering and is seen in tabes dorsalis, Friedreich's disease, cerebellar or labyrinthine disease, and acute alcoholism.

4. Festinant gait; best illustrated in paralysis agitans, is characterized by a few quick forward steps, as if the patient were trying to overtake his own centre of gravity, and on stopping, a few backward ones in the same manner.

The retrostatic type in which the shoulders are thrown backwards and the lumbar spine unduly arched, seen in pregnant women, and corpulent, complacent, post middle-aged gentlemen, frequently on the golf links, and the hobbling gait due to muscular or bony deformities of the lower extremities do not come within the purview of a neurological survey.

Reflexes

Clinically, an investigation of the reflexes is of paramount aid in arriving at a diagnosis. No elaborate mechanical paraphernalia are necessary for their elicitation, and reactions whether positive or negative are always significant. Probably no other phase of simple neurological examination yields a more accurate

means of differentiating organic from functional disease. They may be divided into three groups. (1) Superficial or skin reflexes. (2) Deep or tendon reflexes. (3) Organic or visceral reflexes. The third group is concerned with involuntary non-striated muscles which are controlled by the vegetative nervous system, while the first two have to do with striated voluntary muscles and are the more important from the standpoint of neurological examinations.

Of the many superficial reflexes, the plantar and abdominal supply the most practical information. The plantar reflex is obtained by stroking with a blunt instrument from behind forward the sole of the foot, which under normal conditions results in flexion of the toes and dorsi-flexion of the ankle. This occurs when the arc in itself is intact and is in connection with the cerebral motor cortex by an uninjured pyramidal tract. An abnormal response is characterized by a dorsi-flexion of the toes in which that of the great toe has relatively the most amplitude and is sometimes accompanied by a spreading of the digits. This reaction, known as Babinski's phenomenon, is indicative of a lesion of the upper motor neurone and invariably signifies an organic lesion, a factor of extreme importance when a functional neurosis has to be excluded.

The abdominal reflex is obtained by stroking below and parallel with the costal margin, or above and parallel with the inguinal fold. The normal result is contraction of the abdominal muscles and a movement of the umbilicus towards the site of the stimulus. Absence of this reaction is found in acute abdominal conditions, disseminated sclerosis, and acute meningitis. In brain abscess, with commencing hemiplegic symptoms, the reflex disappears on the hemiplegic side, as it does also in hemiplegia from vascular lesions. Exaggeration of the abdominal reflex is sometimes seen in paralysis agitans and in the gastric or intestinal crisis of tabes, a point to remember in differentiating acute inflammation.

Of the deep reflexes, the more important are the wrist, knee, and ankle. Their diminution or absence signifies organic disease of the reflex arc. Care must be exercised in observing a feeble or absent knee-jerk, since a patient may subconsciously inhibit a response. When this is the case reinforcement must be employed for which Laufenauer's method is probably the best. In this the patient sits with his soles on the ground, and we grasp his quadriceps with the left hand, at the same time instructing him to squeeze our forearm and look upwards. The dual command has the double advantage of directing his attention to the ceiling and informing us if he is carrying out the order. While he is thus pre-occupied down comes the percussion hammer and a normal response will practically always follow in the absence of disease. Lesions of the lower neurone abolishing the reflex may be met with in the peripheral nerves, as in neuritis from alcohol, diphtheria, lead, etc.; in the posterior columns, as in tabes dorsalis, general paresis of the insane, or Friedreich's ataxia; in the anterior horn, as in poliomyelitis or syringomyelia; in the peripheral motor roots, as in Landry's paralysis, and in the muscles themselves. Exaggeration of the deep reflexes may occur in tetanus, strychnine poisoning, neurasthenia and sometimes hysteria, but for practical purposes the great bulk of increased responses signifies disease of the upper motor neurone. In this connection one must always remember that in cases where compensation or damages are claimed for alleged spinal cord or brain injury there may be a marked increase of the knee jerks, but if accompanied by a flexor plantar response an organic lesion is excluded and malingering may be suspected.

In disease or injury of the pyramidal tract clonus is usually present. Clonus is a more or less rapidly repeated contraction of a muscle, induced by sudden stretching of the tendon, and persists during the continuation of tension. It is seen most commonly in the ankle, patella, and jaw, and speaking generally the more persistent the clonus the severer the lesion.

Cerebro-Spinal Fluid

Although it is not advisable in every neurological examination to submit the patient to the discomfort and possible risks of a lumbar puncture, there are many cases where tapping the spinal canal is not only desirable but imperative.

The operation of thecal puncture is best performed with the patient lying on his left side, the shoulders bent forwards, and the thighs strongly flexed on the abdomen, so that the

vertebral column describes the smallest possible arc. A point which bisects the intercristal line is selected for the site of the puncture. The surrounding skin is sterilized, and a 2 per cent solution of novocaine is injected into the skin and subcutaneous tissues with a two inch hypodermic needle. A second needle, about three inches long, of fairly small calibre and preferably of platinum and iridium, is next inserted and thrust forward and slightly upward. The interspinous ligament is pierced and as the needle progresses the resistance of the ligamentum subflavum is encountered. By gentle firm pressure this is penetrated and the needle enters the canal. Withdrawing the stilette a mercurial spinal manometer is attached and the intrathecal pressure measured. This should be done in every case.

Normal cerebro-spinal fluid, which exerts an average pressure of 8 to 10 mm. Hg., is a clear colourless saline solution with a specific gravity of 1006-1008. It contains, besides sodium chloride, a trace of both serum globulin and albumose, as well as glucose which is capable of reducing Fehling's solution, and two or three cells per c.mm.

Abnormal cerebro-spinal fluid is of great diagnostic value. Turbid or purulent fluid would indicate a meningitis. A direct smear should be made and if negative the fluid should be cultured to determine if possible the exact micro-organism. An opaque pink or reddish fluid signifies recent hæmorrhage. This diagnostic sign is valuable in injuries, but especially so in cases of sudden hemiplegia, where the diagnosis between thrombosis and hæmorrhage is in doubt since the treatment of the two is diametrically opposite. A clear yellowish tinge, xanthochromia, is present in severe jaundice and in prolonged compression of the spinal cord. Excess of albumen is found in meningitis, and to a less extent in locomotor ataxia and general paresis of the insane. In the luetic conditions the protein is chiefly globulin. Every specimen of cerebro-spinal fluid should be subjected to the Wassermann test and where indicated the colloidal gold reaction should be obtained. By these means neuro-syphilis may be recognized where repeated blood tests were negative.

The cytology of the cerebro-spinal fluid is of the greatest diagnostic importance. Normal fluid contains no polymorphonuclear leucocytes and only an occasional small mononuclear lymphocyte. In acute microbic infection of the brain or membranes there is a high polynuclear pleocytosis, amounting to hundreds or even thousands of cells per cubic millimeter. In the less acute forms, for it is the acuteness of the condition and not the organism which increases the cell count, such as lues and tuberculosis, the cells may show one hundred or more increase. Abscess of the brain where the meninges are not involved will show no increase. This is a point in differentiating meningitis since both show a marked increase in the white cells of blood.

Puncture of the cisterna magna and cerebral ventricles, together with the use of lipiodol and pneumography, are advanced diagnostic measures requiring special facilities beyond the reach of the average practitioner. Time does not permit of their discussion, and I have purposely restricted myself to those neurological facts which in the main may be gleaned by the use of nothing more than the natural faculties, a percussion hammer, a black-headed pin and a piece of cotton wool.

A county court action was taken in London by an osteopath to recover the sum of £30.9. for services rendered to a patient. The defendant alleged that the plaintiff's diagnosis was wrong, and his treatment unnecessary and unsuitable, and also pleaded the Medical Act of 1858, the plaintiff not being a registered medical practitioner. Judgment was given for the defendant, but, on appeal, a new trial was ordered, their lordships deciding that they were bound by a previous decision, according to which an osteopath is entitled to recover for services rendered.

The diagnosis of the plaintiff was suppuration in the antrum, approximation of the first and second cervical vertebræ, displacement of the coccyx, and shortening of one leg. His treatment was, movement of the cervical vertebræ, reduction per rectum of the displaced coccyx, and ultra-violet ray applications. There was, therefore no need for special treatment. (Adapted from the *Medical Press and Circular*, 1927, p. 363.)

CARDIOSPASM

By Crossan Clark, M.D.

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CARDIOSPASM, a diffuse dilatation of the œsophagus without any anatomical stenosis, has been known as a clinical entity for more than a century. Purton in 1821, reported the first case. Zenker and Von Ziemssen in 1878 compiled seventeen cases from the literature. Recently, the subject has been elaborated by Einhorn, Sippy, Smithies, Plummer, Vinson and others. Plummer reported forty cases from the Mayo Clinic previous to 1908 and 500 additional cases since.

Morbid Anatomy

Most observers—Stark, Baillie, and Howship Rosenheim, have found no post mortem changes in the œsophagus. Krumpell observed a persistent spasm of the cardia shortly after death, which took some force to overcome. When the disease has existed for a long time hypertrophy and dilatation are met with above the obstruction. Smithies says that in marked instances of the affection the hypertrophy of the cardiac sphincter may resemble the hypertrophy seen in hypertrophic stenosis of the pylorus in infancy. This observation has not been noted by other writers on the disease; most of them agree that at autopsy the cardia appears quite normal, but there is hypertrophy and dilatation of the œsophagus with a chronic œsophagitis. The mucosa appears wrinkled, grayish white and pasty, resembling a furred tongue. Erosions may be present and occasionally varicose veins may be met with in the lower portion of the tube.

Etiology

Despite the large number of cases of this condition which have been reported, the cause is still undetermined, though numerous theories have been advanced. Fleiner, Zenker, and Sievers maintain that dilatation results from a congenital muscular irritability in the fibres of the œsophagus. Martin considers primary œsophagitis to be an important factor. Kraus claims that there is a paralysis of the circular muscles of the œsophagus as a consequence of degenerative changes in the vagi. Dr. Golden and Dr. Mosher concluded, from x-ray observations and cadaveric dissection, that the upper border of the liver exerted appreciable pressure on the œsophagus. The left crus makes a crease in the posterior wall of the œsophagus and a marked notch in its left edge so that there is often a ballooning at the extreme lower end of the œsophagus just above this notch. The stage is thus set for a dilatation at this point and a spindle-shaped dilatation is quite common. They also observed that there is an appreciable delay in the barium meal at the upper portion of the liver when such a patient swallows. Any condition which causes a narrowing of this channel through the liver may simulate the condition known as cardiospasm, and these men believe that many of the reported cases have stricture of the liver channel as an etiological factor. They believe that some previous infection of the lesser omentum is the cause of stricture in this location. Marcus believes the condition to be due either to a primary spasm of the cardia or to atony of the musculature of the œsophageal tube. This condition would thus resemble the normal ingluvies of birds, in that it is characterized by marked dilatation of the thoracic œsophagus with retention of large quantities of food. Plummer, following Mikulicz and Meltzer, is of the opinion that, in addition to the changes occurring at the cardiac sphincter, there is some disturbance of the nervo-muscular mechanism which may produce diffuse dilatation of the œsophagus. No other lesion in the œsophagus causes such marked dilatation above the point of constriction, and therefore the factor of loss of tone is as much to be considered as stenosis.

The absence of any hypertrophy of the cardiac sphincter, together with the presence of hypertrophy of the muscular coat, in the cases investigated by Rollenston, led him to believe that the dilatation was due to a failure of the co-ordinating mechanism by which the cardia is relaxed during swallowing.

Brown Kelly maintains that all endoscopic appearances are in favour of spasm, since there is a puckering of the cardiac orifice as the œsophagoscope nears the hiatal opening.

Age.—The majority of patients were young adults from 20 to 40 years, but the condition may be met with in children as young as five years, and in patients as old as 83 (Mayos').

Sex.—Of Mayos' 500 cases 294 were males, 206 females; of Smithies' 47 cases, 22 were males and 25 were females.

Occupation appeared to have little influence in the development of the condition.

Onset.—In Mayos' cases the onset was sudden in 85 cases—17 per cent, and gradual in 415 cases—83 per cent.

Ailments Preceding the Onset of Cardiospasm.—Twenty-three cases are reported by Smithies. In eight, the condition followed an attack of bronchitis and asthma; in seven, it was precipitated by shock, fright and acute fatigue; in five, it occurred in men who smoked excessively; and in three, the patients suffered from gastric ulcer; after operation the cardiospasm was in no way influenced. Vinson reports that in 301 cases, 41 patients had associated neurotic complaints and six had syphilis.

Symptoms

The predominant symptoms are dysphagia, pain, and regurgitation. *Dysphagia.*—Frequently this symptom occurred suddenly while the patient was eating solid food, especially apple, or while drinking cold water. The sense of obstruction was at first intermittent, but with the progress of the disease it became more and more pronounced, until complete closure occurred (in about 33 per cent) lasting from 34 hours to 18 years. An interesting feature was that although the patient may be able to wash solid food into the stomach by drinking large quantities of water, he was not able to drink cold water alone.

Pain.—The Mayos report that 262 out of the 500 cases examined had epigastric pain of varying severity, it being the chief symptom in many cases. Severe attacks of pain antedated the dysphagia by months or years in several instances, and in not a few a diagnosis of cholecystitis was made. There was a great variation in the degree of pain. Mild cases complain of a sense of discomfort, while the more severe may simulate gall-stone colic or angina. As a rule there is no association of the pain with deglutition. Occasionally, however, there was radiation of the pain from the epigastrium to the back, or into the neck and ears. The severity of the pain may be such that morphine may be required to relieve it; many cases may be relieved by simply sipping warm water. The pain becomes lessened with the onset of dysphagia, and occasionally it disappears entirely.

Regurgitation occurs with the onset of dysphagia. At first it follows soon after the ingestion of food; but later, with the greater dilatation of the œsophagus, it may be delayed for hours or even a day. Of the 500 cases reported by the Mayos, 181 had nocturnal regurgitation. The regurgitated food is sour smelling and stale, and does not contain hydrochloric acid, rennin or pepsin. The quantity may exceed several pints, and occasionally particles of food are identified, which had been eaten several days before.

Among the minor symptoms are the following: *Loss of weight.*—This occurs more especially during the early stages of the disease and is due to the restricted intake of food. As the disease progresses, the patients acquire habits whereby they can force food into their stomachs. They do this by filling the œsophagus and then compressing it by pressing the chin on the chest. *Constipation.*—Also a predominant symptom in the early stages. Smithies reported the symptom in 53 per cent of his cases. *Respiratory symptoms.*—Due to repeated regurgitation at night with frequent aspiration of small particles of food. Milder pulmonary symptoms from the pressure of a dilated œsophagus filled with food and mucus are noted in many instances. Other symptoms are: *hiccough; foul breath; unpleasant taste; frequent expectoration and eructations of gas.*

Methods of Examination

Auscultation.—If one listens near the xiphoid process, or along the lower dorsal vertebræ, after a patient has swallowed a mouthful of water, two murmurs may be audible, a squirting sound followed by a squeezing murmur. A distinct squirting after a single act of swallowing is regarded by Meltzer as an evidence of insuffi-

ciency of the cardia. A total absence of squeezing murmurs may indicate stenosis of the cardia.

The œsophagus may be examined more directly by the passage of bougies, by x-rays, and by œsophagoscopy.

The Passing of Bougies.—One should begin by passing an Ewald stomach tube in the usual way. If resistance be met with, recourse to a firmer instrument, sound or bougie, may be necessary. Once the bougie is in the œsophagus, press it slowly downward until it meets with resistance, due to temporary spasm of the œsophagus. In such a case, wait for a few moments until the spasm passes off and then proceed. If resistance is encountered, note the exact position, degree, and nature. Repeat the examination on different days to make sure that the resistance is in exactly the same location.

Fluoroscopic Examinations.—A marked dilatation above the constriction by this method may generally be seen. The lower end of the shadow cast by the bismuth ends as a blunt or regularly conical obstruction, which is rarely seen in any other condition. In some cases the œsophagus may contain much fluid, through which the opaque meal falls in blobs. In long standing cases, the œsophagus may be more or less elongated and S shaped. The capacity in advanced cases may be 500 c.c. or more. An examination of the patient one hour after administration of a thin meal will show practically none of the meal in the stomach.

Œsophagoscopy.—This is indicated when there is some doubt as to whether the disease is complicated by carcinoma, peptic ulcer, or foreign body, or when powerful contractions of the cardiac sphincter persistently recur. The appearances are those presented by a markedly dilated œsophagus with some static œsophagitis. The œsophageal opening is normally contracted, and when found will permit a large œsophagoscope to pass.

The contra-indications to this measure are, the existence of any symptoms pointing to the possibility of aneurism; any recent vomiting of blood, severe myocardial disease, or severe cachexia.

Differential Diagnosis

Carcinoma of œsophagus may be distinguished by the following: (a) It usually occurs in old age; (b) there is no free hydrochloric acid in the stomach; (c) the duration of symptoms is much longer in cardiospasm, and there is as much difficulty in swallowing liquids as solids; (d) by the appearance of the obstruction at the cardia on roentgen-ray examination; (e) in some cases by the œsophagoscopic examination. The following conditions must also be borne in mind: diverticulum of the œsophagus; hernia of the stomach through the diaphragm; angina pectoris; gall-stone colic.

Treatment

1. *Antispasmodic Drugs.* — Temporary relief may be afforded in a few cases by the use of atropine.

2. *Œsophago-Gastrostomy.* — This operation has been discarded because of attending risks and poor results.

3. *Dilatation.*—The first results of this operation were accomplished by gastrotomy and digital expansion of the cardia. More recently, however, it has been found that a hydrostatic dilator can be introduced through the mouth to stretch the cardia. Metal sounds do not dilate sufficiently to afford any permanent relief. The best results have been achieved by the use of the hydrostatic dilator. This is guided into the stomach on a previously swallowed silk thread. It is then distended and pulled back forcibly against the cardia. The water pressure is then reduced and the proximal end is allowed to slip back into the œsophagus. Water pressure is renewed and the cardia dilated. In cases in which the œsophagus is not widely dilated 16 to 22 feet of water should be the pressure used. If dilatation is more marked, 24 to 28 feet can be used with safety. Pressure should be maintained for from two to five minutes, and then released. The safety depends more on the size of the bag than on the pressure used. Dilatation is usually painful, and if pain is not experienced at the time of dilatation, the dilator has probably slipped into the stomach or œsophagus. About 10 per cent have a recurrence of the pain within 36 hours after the treatment. The patient should be kept in hospital for at least 24 hours, and under close observation for one week. A local anæsthetic is generally employed. As complications of dilatation fatal rupture of the cardia has occurred;

moderate hæmorrhage from the œsophagus; also an attack of pleurisy with effusion.

Results of Treatment

Roentgen-ray studies after dilatation usually demonstrate no obstruction at the cardia. In some cases there is a moderate obstruction of a barium meal without symptoms of food obstruction. In this latter group there are no more recurrences than in the cases where the x-ray examination is entirely negative.

Plummer and Vinson report on 299 cases after dilatation as follows: patients traced 246; hospital deaths 0.66 per cent; patients dilated and completely cured, 187 or 76 per cent; patients improved, 42 or 17 per cent; patients no better, 15 or 6 per cent.

Case Report

F. S., a girl, aged 5 years, admitted February 9, 1927.

Present Illness began six months previously with vomiting. The child had been sick with diarrhœa for two weeks—a condition which had been diagnosed as "summer flu" when the vomiting suddenly started. The child vomited every meal every day for six months; she would vomit unchanged food into her plate and then continue to eat until she eventually ingested the entire meal, taking fifteen to thirty minutes longer than other children. Pain was never complained of. Hot or cold water did not aggravate the condition. The chin was never compressed on the chest to force food into the stomach.

Previous History.—The child had been nursed two months, but did not thrive. After weaning, it was fed on Eagle Brand condensed milk for four years; then on cow's milk and mixed food. She was able to sit up alone at two years; she talked at three years, but appeared to be mentally backward; she was able to walk at four years.

Physical Examination.—A well nourished, rachitic child. Her weight was 31¾ pounds. Her teeth were in very bad condition. The tonsils and adenoids were enlarged and there was a purulent post-nasal discharge. The heart, lungs, and abdomen were normal. The Wassermann test was negative. The examination of the urine showed acetone and diacetic acid 4 plus in excess. Examination of the blood—red cells, 4,920,000 per c.mm.; hæmoglobin, 70 per cent; leucocytes, 8,600 per c.mm.; polymorphonuclears, 84 per cent; transitionals, 2 per cent; large lymphocytes, 10 per cent; small lymphocytes, 4 per cent.

Radiographic Report — Fluoroscopic examination showed that the barium meal had passed readily down the œsophagus to the cardiac opening of the stomach, where it was almost completely obstructed. In three to five minutes a small amount of the barium passed through into the stomach. The œsophagus was markedly dilated above this point.

Treatment.—Consisted of a series of ten dilatations, over a period of two and one-half months (February 15, to April 30, 1927), using bougies from No. 21 to No. 36.

Since the first dilatation on February 15th, the child had had no vomiting, had been able to eat all solids, had shown a fairly steady gain in weight from 31¾ pounds to 37 pounds, and has now become sturdy and strong, playing about with other children.

ON THE DIAZO REACTION IN URÆMIC SERUM AND IN NORMAL URINE*

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When investigating the hypobilirubinæmia indicated by the van den Bergh test in uræmic sera Andrewes[1] discovered a new type of diazo reaction. He found, on allowing the mixture of alcoholic extract from a uræmic serum to stand in contact with the van den Bergh reagent for a period of twenty-four hours that a pinkish-brown or buff colour developed, and that when this in turn was made alkaline with a strong alkali, but not with a weak alkali, a bright red colour immediately developed which was stable for from a few minutes to over half an hour according to its original intensity.

The findings of Andrewes were shortly afterwards confirmed by Hewitt[2] who improved the technique of the test by showing that heating the mixture of alcoholic extract and diazo re-

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agent for a period of thirty seconds brought about the same development of buff colour as did letting the mixture stand for twenty-four hours. Hewitt further observed that the presence of alcohol is necessary in the test and that the colour development is interfered with by the presence of acetic acid.

Rabinowitch[3] further confirmed the clinical findings in relation to the test, while Blotner and Fitz[4] have recently shown that a positive test may be obtained in dog or rabbit serum 24-48 hours after nephrectomy.

The present research commenced with a study of the sera from nephrectomized rabbits and dogs. Nephrectomy was performed on four rabbits and a number of dogs with the main object of obtaining material for the investigation of the chemical nature of the unknown substance. The tests on the sera from these animals confirm the findings of Blotner and Fitz and there is thus no need to reproduce more than representative protocols here. The diazo test used is the modification described below unless otherwise stated. The non-protein nitrogen, (N. P. N.) in the following cases is expressed as mgm. per 100 c.c. of whole blood.

Rabbit No. 184

April 12th—10.00 a.m. nephrectomy.
April 13th— 3.00 p.m. N.P.N. 140 Diazo + +
April 14th— 3.30 p.m. N.P.N. 167 Diazo + +
April 16th— N.P.N. 333 Diazo + + +

Rabbit No. 186

April 12th—10.00 a.m. nephrectomy.
April 13th— 3.30 p.m. N.P.N. 123 Diazo + +
April 14th— 3.30 p.m. N.P.N. 173 Diazo + + +
April 16th— N.P.N. 280 Diazo + + + +

Both of the above rabbits looked surprisingly well before exsanguination on April 16th.

Dog 1

April 20th nephrectomy, N.P.N. 32 Diazo –
27 hours later, N.P.N. 126 Andrewes test – Present modification of test +
40 hours still later, N.P.N. 307 Diazo + + +

Dog 6

May 12th— 3.00 p.m. nephrectomy.
May 13th— noon . N.P.N. 75 Diazo + +
May 14th—11.00 a.m. N.P.N. 147 Diazo + +
May 16th— 3.00 p.m. N.P.N. 267 Diazo + + + +

The statement of Hewitt that "The presence of acetic acid interferes with the reaction and may even inhibit the appearance of the pink colour entirely" was confirmed, and an explanation of this unusual type of inhibition sought. It was soon found to depend on the buffering action of the acetic acid; for, if solutions containing acetate were made strongly acid with hydrochloric acid the inhibiting effect of acetic acid was wiped out. This suggested that the sensitivity of the test might be raised and such a type of interference reduced by raising the acidity of the coupling medium. This, indeed, has been accomplished merely by the addition of hydrochloric acid before heating. It is obvious that the extra hydrochloric acid could be incorporated in the sulphanilic acid solution but that might make it less convenient, as a different sulphanilic acid solution would require to be used in making the reagent generally employed for the van den Bergh test.

As there are a few minor modifications in our technique it is perhaps as well to give here the solutions and test which have been used for some time for this purpose in the Toronto General Hospital.

One grm. of *sulphanilic acid* is added to a litre flask containing about 500 c.c. of water and 15 c.c. of 37 per cent (concentrated) hydrochloric acid. The contents are shaken at ordinary temperature till the sulphanilic acid has gone into solution. Water is then added to the mark and the contents mixed. The solution keeps indefinitely.

It is more convenient and reliable to have a stock 5 per cent *sodium nitrite* solution than to make 0.5 per cent solutions at weekly intervals. Five grm. of good quality sodium nitrite are dissolved in water and made to 100 c.c. This is kept in a stoppered bottle and is reliable for at least a year if kept in an ice chest, and for several months without the latter precaution. One c.c. of this solution is mixed with 9 c.c. of water before each diazotization.

Sufficient of the *Diazo reagent* for more than 20 tests is made by taking 10 c.c. of the sulphanilic acid solution in a test tube, preferably cooled by running water, and adding 0.3 c.c. of the diluted sodium nitrite solution. If kept in water below 10° C., or in an ice chest when not in use, the diazo reagent is dependable for twenty-four hours.

The test is performed by precipitating and centrifuging the serum or plasma with 2 volumes of 95 per cent alcohol, taking 1 c.c. of the supernatant fluid in a small test tube, adding 0.4 c.c. of the diazo reagent and 0.1 c.c. of concentrated hydrochloric acid. The tube is heated over a

flame, or in a water bath at about 80° C., for a minimum of two minutes. If the test is positive the buff colour will then have fully developed. The tube is cooled and 1.0 c.c. of 2.5 normal sodium hydroxide is added and the tube quickly inverted. The intensity of the red colour thus produced accords with the buff colour obtained in acid solution. As the buff colour is very stable it is the more suited for comparative tests. At any rate it can be preserved until it is convenient to add alkali to a series of tubes at the one time.

As originally pointed out by Andrewes the secondary red colour is produced only by the addition of strong alkali. Nor will this colour develop with strong alkali in the presence of a large amount of ammonia. So that ammonium sulphate can not be used in this test in association with alcohol to precipitate the proteins from the serum as recommended by Thannhauser and Andersen[5] for the van den Bergh test.

As is true for the diazo reaction with bilirubin there must be no excess of nitrous acid in the diazo reagent used for the present test.

With our technique the test is still entirely negative in normal blood plasma but as may be seen in the case of Dog 1, it shows the retention of the substance in the blood sooner than with the previous technique.

Normal urine was originally tested by Andrewes and found to give a negative test, possibly because Andrewes may not have added alcohol to his test—the necessity for the presence of alcohol being first pointed out by Hewitt. But later observers have apparently not tested urine. The test is readily obtained by taking 0.1 to 0.2 c.c. of urine, 1 c.c. of 95 per cent alcohol and proceeding as for the alcoholic extract from blood. 0.1 c.c. of normal urine commonly gives as strong a test as 1 c.c. of the alcoholic extract from a uræmic plasma, and as 1 c.c. of alcoholic extract is equivalent to about a third of a c.c. of plasma, normal urine commonly has thrice the concentration of the substance in question that a uræmic plasma has. Only one urine from a patient with retention has so far been examined. This patient, who died three days later, was diagnosed as a toxic infective jaundice complicated by pyelo-nephritis. The N.P.N. was 150 mgm. per 100 c.c. of blood, the van den Bergh test showed 25 units in the serum and the CO_2 combining power was markedly lowered. The urine from this patient showed a negative test by the method described. The large amount of bilirubin in the serum completely masked any of this normal urinary constituent which may have been retained.

Two normal fæces have been tested and found negative, so that the substance is probably excreted solely through the kidney.

Summary

A modification of the Andrewes' diazo test is suggested which increases its sensitivity and renders it less liable to interference.

The substance giving the diazo test in uræmic sera is shown to be a normal, but as yet unidentified, urinary constituent.

The substance is absent from normal fæces.

The discovery of the substance in normal urine widens clinical interest in the test, and provides an unlimited supply of material for the investigation of the chemical nature of the substance in question.

The desirability of investigating the diazo reaction in uræmia was suggested to one of us by Professor Duncan Graham. We should also like to record our indebtedness for material to Doctors W. R. Campbell, R. F. Farquharson and E. J. Maltby, Toronto General Hospital.

References

1. Andrewes, C. H., *Lancet*, 1924, I, 590.
2. Hewitt, L. F., *Biochem. J.*, 1925, xix, 171.
3. Rabinowitch, I. M., *Canad. M. Ass. J.*, 1925, xv, 725.
4. Blotner, H., and Fitz, R., *J. Am. M. Ass.*, 1927, lxxxviii, 985.
5. Thannhauser, J. S., and Andersen, E., *Arch. f. klin. Mediz.*, 1921, cxxxvii, 179.

DUODENAL ULCER*

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DYSPEPSIA or indigestion is not always due to or associated with structural changes in the organs of digestion. It may be a manifestation of cardio-vascular renal decompensation, of primary anæmia, or other constitutional disharmonies; it may be the logical expression of fatigue incident to the struggle for a modern competence, or result from business or domestic anxiety; it may represent the protective compensation which nature affords the constitutionally inadequate. Before any case of dyspepsia can be confidently classified, an examination sufficiently thorough to exclude organic disease must be undertaken. Functional dyspepsia may lead to confusion in diagnosis, and may modify prognosis in structural disease, since the patient with organic disease is not immune from functional disharmonies, but is, on the contrary, predisposed.

Incidence

In the last four years, out of each 100 cases in which the complaints were considered to justify roentgenoscopic studies of the stomach and duodenum, organic disease was shown to be present in about twenty-seven. The incidence of duodenal ulcer (Table I) is about

TABLE I.

Percentage Ratio of Organic Disease of Stomach and Duodenum Diagnosed by Roentgen Ray over a Four-Year Period

Year	Duodenal ulcer, per cent	Gastric ulcer, per cent	Gastric and duodenal ulcer, per cent	Carcinoma of stomach, per cent	Carcinoma of œsophagus, per cent
1923	68.57	6.67	1.33	19.68	3.72
1924	71.52	7.36	1.31	16.39	3.4
1925	71.36	7.77	1.36	15.85	3.63
1926	72.28	8.10	1.62	13.51	4.46
Average	71.12	7.56	1.42	16.01	3.86

ten times as frequent as gastric ulcer, and malignant disease of the stomach and œsophagus is encountered almost three times as frequently as benign ulceration of the stomach. The relatively rare incidence of benign gastric ulcer is stressed, since, in the literature, duodenal ulcer is still often classified as gastric. Robertson and Hargis, in the routine study of material from 2,000 necropsies, found unsuspected evidence of chronic duodenal ulcer in 6.4 per cent of the cases. In our experience duodenal ulcer is discovered about three and a half times as often in the male as in the female. The sex incidence is about the same as that of benign gastric ulcer or gastric carcinoma, while in cholecystic disease the converse is true, this being more frequent in females.

Symptoms

The clinical syndrome of uncomplicated peptic ulcer is well known. Epigastric discomfort comes on at an appreciable interval after food. It is relieved by taking more food or by alkalies. Attacks of discomfort occur periodically. When complications occur such as penetration of or adhesions to adjacent tissues, or when cicatrization produces deformity and motor dysfunction, the complaint loses its characteristic type. Food may aggravate, alkalies give only temporary relief, vomiting becomes frequent, actual pain is more often present, and the nature of the disorder may be surmised only by carefully eliciting the remote history, that is, the story of the period of dyspepsia which antedated the onset of complications. It is not unusual to read that gastric ulcer differs fundamentally from duodenal ulcer. Surgeons are particularly apt to make a distinction because they are impressed with the necessity of treating the two conditions differently. A gastric ulcer must be attacked directly (excised or destroyed), while the majority of duodenal ulcers respond to indirect treatment, as by gastro-enterostomy. The surgeon is further aware that the immediate risk of operation and its ultimate results give him less anxiety in cases of duodenal than in gastric ulcer. But in my experi-

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ence they are identical in one particular, the clinical syndrome. Each presents the characteristic daily sequence of events during an attack, namely, pain, food, and ease. There are no distinguishing physical signs. If we admit that the clinical picture in gastric ulcer is more often blurred or indistinct, we are still without any data of differential diagnostic value. The anatomical localization of an ulcer depends wholly on the roentgenological examination. In our tendency to use figures of speech, we may refer to the knife when we mean the surgeon, or the mashie when we mean the golfer and to the x-ray when we refer to the roentgenologist. In no field of medical endeavour is it more necessary to stress the human element than in roentgenology, and skill and accuracy are the product of patient practice, checked by the revelations of the surgeon at the operating table. In earlier days, when diagnosis was made with greater relative frequency in cases of complicated peptic ulcer, physical signs, such as local tenderness, rigidity, or points of referred pain, were of greater importance in diagnosis. We now know that ulcer may cause severe disability without local tenderness, without vomiting, without gross bleeding or even consistent evidence of occult blood in the stools. Similarly, we no longer regard hyperacidity of the gastric contents as essential to diagnosis. A disabling duodenal ulcer may exist with normal or even low acidity. But while free acidity has lost much of its diagnostic value it retains prognostic significance. We know, on the one hand, that high free acidity associated with primary ulcer suggests the possibility of recurrence, while on the other hand an ulcer which has persisted in the presence of a low degree of free acidity may be regarded as likely to be resistant to treatment whether medical or surgical, if such treatment is indirect and has for its object the lowering of gastric acidity.

The Experimental Study of Peptic Ulcer

Mann and his co-workers have succeeded in producing chronic peptic ulcers in dogs. Their experiments were undertaken in order to study the rôle of the acid-pepsin secretion of the stomach in the production and prevention of healing in ulcer. They found that it was impracticable to increase satisfactorily the acidity of the gastric contents by the administration of strong acid, so they decided to bring about an increase of acidity by removing the neutralizing influence of the alkaline content of the duodenum. The alkali in duodenal contents is derived from the secretion of duodenal mucosa, from bile, from pancreatic juice, and to a small degree from the mucosa of the pyloric end of the stomach. Space does not permit a comprehensive review of this work, which may be consulted in the original. Certain illustrative experiments may be outlined.

1. It was found that when the bile duct and pancreatic duct were transplanted into the lower ileum (thus removing these two sources of alkali) duodenal ulcer developed in ten out of thirty-one cases; five of the ulcers were chronic.

2. The duodenum was cut across at the pylorus and also at its junction with the jejunum. The upper end was closed and the lower end united to the lower ileum. The upper end of the jejunum was anastomosed to the pylorus. This procedure permitted the acid gastric contents to impinge on the jejunal mucosa which was deprived of the protection of the normal alkaline secretions. In practically all cases chronic peptic ulcer developed just beyond the pyloric anastomosis, which had the gross and microscopic appearance characteristic of peptic ulcer in man.

3. If, after a chronic jejunal ulcer had been produced by the method just described, the pylorus was occluded and the stomach drained into the small intestine by gastro-enterostomy, the experimentally-produced jejunal ulcer proceeded to heal. This is ascribed to protection of the ulcer from gastric secretion.

4. Morton produced chronic gastric ulcers by the following procedures:

In a series of animals to be used as controls he opened the stomach and cut out pieces of mucous membrane, thus producing acute ulcers. These healed rapidly. He prepared a second series of animals by isolating the duodenum and draining its alkaline secretions into the lower ileum; then he anastomosed the proximal end of the jejunum to the pylorus. When the animals had recovered he repeated the procedure of producing acute defects in the gastric mucosa. Then not only did he secure a typical

chronic jejunal ulcer, but also chronic gastric ulcers.

In discussing these experiments Mann has emphasized the difference between a statement of observed facts and the interpretation of such phenomena. He believes that the factor of general malnutrition of the animals was excluded and is especially convinced that local trauma was not a factor in the production of the jejunal ulcer, because the ulcer did not begin to form until healing had occurred at the site of anastomosis. It seems reasonable to infer from these experiments that the normal alkaline content of the duodenum, made up of duodenal secretion, bile, and pancreatic juice, is an enormous factor not only in preventing the development of peptic ulcer, but in promoting healing of an ulcer already established.

Somewhere between over-enthusiasm and stubborn skepticism lies the truth regarding the relationship of focal infection to the occurrence of duodenal ulcer. It has been my privilege in hundreds of cases to witness the uncanny precision with which organisms from infected teeth or tonsils of patients suffering from peptic ulcer have produced acute hæmorrhagic lesions in the duodenum and stomach when injected into laboratory animals, and to observe the failure of infective material to cause localized lesions when such material was obtained from patients suffering from other diseases.

Rosenow's observations have been confirmed by Haden in America and by Mouthier in France, and others.

Treatment

The attitude of the profession toward the treatment of peptic ulcer is becoming stabilized. Before the advent of the x-ray and accurate diagnosis, the treatment of duodenal ulcer was largely the treatment of the complicated ulcer. It has been facetiously, but more or less truthfully, said that in earlier days a duodenal ulcer was frequently treated by removing the appendix through a McBurney incision; this procedure being based on mistaken diagnosis. The alert physician is now no longer content to treat only the patient who has a complicated duodenal ulcer. He is aware that he must come to the assistance of the man who, by reason of the periodically recurring discomfort of a simple peptic ulcer, is rendered economically below standard. It may be simply that there is persistent interference with the person's daily work or he may be restricted in his choice of an occupation, or afraid to accept proffered advancement. In other words we are no longer justified in treating only those whose lives are threatened.

I have already pointed out that a few ulcers of the duodenum fail to produce symptoms and are recognized only at necropsy as larger or smaller scars. Since malignant degeneration does not occur in duodenal ulcer, treatment may be undertaken without the dread of missing an early cancer, a possibility which must always render uncertain any attempt at medical treatment of a lesion on the gastric side of the pylorus. We have all had the experience of seeing the symptoms of duodenal ulcer disappear and the patient become and remain apparently well, not because he followed some special form of management, but in spite of his disregard for our carefully thought-out advice. In selecting patients for treatment, the indication is therefore the degree of disability or of economic inefficiency which has persisted, in the face of reasonable efforts on the part of the patient to overcome it. The object of treatment will be to save life when life is threatened by hæmorrhage, perforation, or increasing obstruction, but an increasing number of patients are entitled to economic rehabilitation, precisely as though they had a painful inguinal hernia or a loose cartilage in the knee joint. Moreover, treatment must in such cases go farther than recommending a truss or applying a splint. It should aim at the complete restoration of the patient to all of the necessary activities of his occupation.

At the Mayo Clinic in 1926 surgical treatment was undertaken in 41 per cent of cases of duodenal ulcer. It was advised in a slightly greater percentage, but in a very considerable number of cases it was felt that the patient should take advantage of the prospect of relief under medical management. While there is a good deal of controversy regarding the details of medical management, there is rarely any sustained argument regarding the principles of treatment. These principles depend on two simple phenomena: something causes local necrosis, and the acid and pepsin of the

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gastric juice hinder healing. There are reasons for thinking that bacterial toxins are not the sole cause of the necrosis but, so far as I am aware, the eradication of foci of infection constitutes our only method of attacking this phase of the problem. In order to obviate the hindrance to healing, medical management and gastro-enterostomy are alike directed to the lowering of gastric acidity. If medical management is selected, should the patient be put to bed, and what sort of food should be given? It is my opinion that most if not all of the patients who are likely to become permanently free from symptoms on medical management will do so on an ambulatory regimen, and that bed treatment may be reserved for those cases in which other disease renders surgical treatment undesirable. Undoubtedly, all of us have been confused, and correspondingly impressed, by the various diets recommended for the treatment of peptic ulcer. In no field of human interest has the attempt to capitalize information before it becomes available, been more assiduous than in respect to diets in general. The weekly papers and magazines abound in alleged information regarding the relationship of diet to disease in general, and almost any of us is likely to believe that a printed diet slip has some occult merit. But a careful analysis of the principle of treatment of peptic ulcer demonstrates that the food to be used is that which will neutralize acidity. We might well place all of the recommended diets in a hat and pick one blindfolded; for variety I would suggest that seven be chosen, one for each day of the week.

Should alkalies be used? Do they reduce acidity? Do they do any harm? My own experience leads me to recommend alkalies; they reduce acidity and have one advantage over frequent feedings that they do not satiate the patient; they are never harmful in moderate dosage. The complaint is sometimes made that medical treatment fails because the patient failed to carry out instructions, or did not follow the prescribed treatment long enough. The blame cannot always fairly be placed on the patient; his default may be due to a defect in the plan of treatment. Frequent feedings with alkalies may rapidly abolish symptoms although the ulcer has not healed. This is analogous to the primary sore or secondary rash which disappears quickly following one or two injections of arsphenamine. A successful plan of treatment must be fool-proof; herein lies the advantage of a gastro-enterostomy which provides an automatic mechanism by which the duodenal alkalies are mixed with the acid gastric juice.

Surgical treatment of uncomplicated duodenal ulcer is not urgent and can therefore be, and should be, undertaken only when every precaution possible insures the immediate safety of the operation, and when the operator's experience and skill are such that the ultimate surgical result is likely to be safeguarded.

Balfour has reported a series of 400 consecutive operations on the stomach with a mortality of 1 per cent. This series included 114 resections of the stomach for various reasons, including forty-six for carcinoma.

Results of Treatment

An important modification of the good results of treatment, whether medical or surgical, may be brought about by the simultaneous or subsequent occurrence of one or more of the functional disturbances already mentioned. How much prolonged treatment of any sort may predispose to an anxiety neurosis must always give us thought. We are accustomed to look on the victim of ulcer as a restless aggressive type of individual; certainly in the resistant cases the patient is usually high-strung, but it is a question whether the temperament predisposes to ulcer, or prolonged discomfort and anxiety produce the temperament. The desirability of controlling the personal hygiene and habits of living of the patient suffering from ulcer is something in which we all believe, just as we believe in eugenics, the League of Nations and prohibition, but it is difficult to accomplish and usually only idealists persist in the effort.

In any case, advice to patients with respect to treatment or after-care should be conservative. One should avoid such meddlesome interference with the personal liberty of the individual as may introduce a sense of insecurity. If restrictions are to be imposed, the reasons for them must be understood by both patient and physician.

Conclusions

1. Functional dyspepsia may lead to confusion in the diagnosis and may interfere with the prognosis in disorders of digestion due to organic disease.

2. Duodenal ulcer is about ten times as frequent as gastric ulcer, which simulates it as regards the clinical syndrome, but differs in its response to treatment and in the fact that it may be confused clinically with malignant disease. A peptic ulcer can be anatomically located only by a trained roentgenologist.

3. An uncomplicated duodenal ulcer may be the cause of severe disability and deserves treatment. Physical signs are of relatively little value in the diagnosis of uncomplicated ulcer.

4. Experimental workers have shown that the normal alkalies of the duodenum protect animals against the development of chronic peptic ulcer and that the acid gastric juice hinders healing.

5. Rosenow's observations on the relationship of focal infection to acute ulceration of stomach and duodenum have been confirmed.

6. The principles of the treatment of peptic ulcer are simple and are the same in medical as in surgical treatment. The chief indication is to lessen the retarding influence which the gastric juice has on healing.

7. Surgical treatment for uncomplicated duodenal ulcer is not an emergency procedure.

8. Instructions to patients regarding after-care should be conservative, understandable, and practicable.

DUODENAL DIVERTICULA

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DUODENAL diverticula were first described in 1710 by Chomel, but it was not until 1912 that the presence of such was demonstrated by means of the roentgen ray. This was first accomplished, I understand, by Dr. Case, who in 1913 presented a series of four cases discovered during routine gastro-intestinal examinations.

Since then, many series of cases have been reported, and the condition is no longer regarded as an anatomical curiosity, but rather as one of the many important findings that are being constantly met with in the course of careful, systematic, studies of the digestive tract.

Occurrence.—Baldwin in a series of 105 autopsies reports 14 cases of duodenal diverticula. This is by far the most numerous occurrence recorded in the literature. Linsmayer reported 45 cases in 1367 autopsies (or in about 3 per cent of cases). Hartung reports 8 cases in 1500 gastro-intestinal examinations. Case, in 1920, reported 84 cases demonstrated in 6,847 routine gastro-intestinal examinations (1 in 82 cases, or 1.2 per cent). Groover and Christie found 8 in 1,300 gastro-intestinal examinations. Watkins reports 4 cases in 1,000 gastro-intestinal examinations and Cole and Roberts in 1920 reported 30 cases. In our last 770 gastro-intestinal examinations we have been able to demonstrate typical duodenal diverticula in 40 cases or in one out of every 20, that is in about 5 per cent of cases coming for gastro-intestinal examinations.

Age.—Diverticula of the duodenum are usually found late in life. The average age in Case's series was 56. Simmonds (Case) reports having seen diverticula near the pylorus in very early childhood and concludes that they are congenital in origin. Secher (Case) says that they have been found in infants. In a series of 45 cases we have found the average age to be 51.7. The youngest case was 24 years of age and the diverticulum was small in size.

Sex.—Diverticula appear to be much more common in females. In Case's series of 85 cases

Fig. 1.—This shows a large diverticulum of the second portion of the duodenum.

51 (or 60 per cent) were in females. In our 45 cases 30 (or 66.33 per cent) occurred in females.

Size.—The size may vary from that of a pea to that of a small orange. In this series of 45 cases 13 were described as being between the

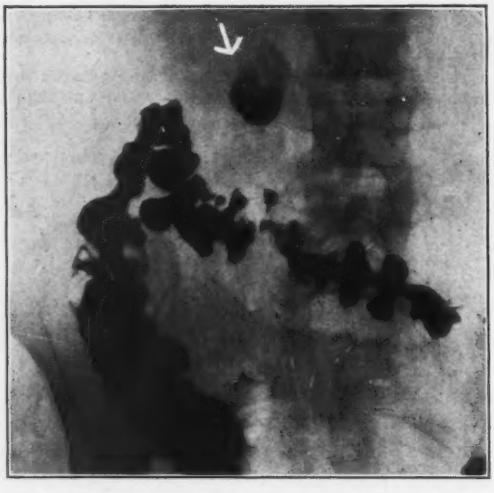

FIG. 2.—This is the same case as shown in Fig. 1 and shows the diverticulum to be still containing barium at the twenty-four hour observation period. This patient also had colonic diverticula.

size of a pigeon's egg and that of a small orange. Ten were between the size of an almond and a walnut and 27 were described as varying in size from that of a pea to an almond.

In Case's 85 cases the shadow of the barium-filled diverticulum measured more than 4 c.m. in 14 cases; the average was 2.8 c.m.

Position.—In Case's series the location of the diverticula was as follows:—

First portion, 17 cases.

Second portion (including those thought to be possibly dilatations of the ampulla of Vater), 49 cases.

Third portion and duodenal pepunal flexure, 19 cases.

Cole and Roberts series showed the following:—

First portion, 2 cases.

Second portion, 23 cases, 2 in 1st or 2nd.

Third portion, 3 cases.

In Baldwin's autopsy series the location was as follows:—

First portion, 2 cases.

Second portion, 7 cases.

Third portion, 6 cases.

The location in our series of forty-five cases was as follows:—

First portion, 1 case.

Second portion, 30 cases.

Third portion and duodenal jejunal flexure, 19 cases.

From the above it is seen that more than half occur in the second portion and some of these may be actually dilatations of the ampulla of Vater and hence the name "Peri-Vaterian" as applied to these occurring in this region by French writers.

Contents of the Sac.—The contents of the sac are usually chymous. At least two cases have been reported in which the sacs contained gall stones. In one case one stone, and in another twenty-two were found. Barium may be retained for many hours after the meal. In one of our cases the diverticulum still retained barium on the fifth day of the examination. In this connection, the position and size of the opening or ostium is important, for, not having a muscular coating, the emptying must be attained by other means; that is, chiefly by gravitation, and by pressure from other organs.

Anatomy.—They are false diverticula; that is, they do not contain all of the coats of the bowel. The mucosa and submucosa are present, but the muscular coats are lacking except for occasional stray fibres. They are in fact true herniations of the mucosa through the muscular coat. The intestinal glands (glands of Lieberkuhn) are often present but duodenal glands (Brunner's glands) are rarely so, (Case and Nagel). Small amounts of pancreatic tissue are often found in the mucosa.

FIG. 3.—This shows a diverticulum of the second portion of the duodenum in the region of the ampulla of Vater (and it quite possibly is the dilated ampulla). It shows a central circular filling defect.

The patient was admitted to the hospital with very acute upper abdominal pain and vomiting.

As shown above, the most common site is that of the second portion of the duodenum. Nagel in a series of twenty (autopsy) cases found all of these to be within a radius of 3 c.m. from the ampulla of Vater. A number of these lay directly along the course of the common bile

FIG. 4.—This is the same case as shown in Fig. 3, but taken several days later and after the subsidence of pain. There is then no filling defect and it was suggested that this defect had been due to a gall stone that had passed into the bowel from a dilated ampulla of Vater.

duct, and separated from it by loose areolar tissue only. Some occupied a place between the bowel wall and the head of the pancreas. Many were completely buried in the head of the pancreas. None showed evidence that inflammatory processes had been factors in their formation.

Surgical Anatomy.—The surgical anatomy is important. When the diverticulum arises from the anterior portion, or the greater curvature side, of the duodenum, it is usually covered merely by peritoneum and is easily approached. When it springs from the lesser curvature side or posteriorly, it may be posterior to the head of the pancreas or may be buried in the gland. The relation of the pancreatic ducts is also important. The ducts lie in the posterior or dorsal part of the head. A diverticulum imbedded in the head of the pancreas nearly always lies in front of the ducts. The duodenal branches of the pancreatic-duodenal artery may pass over or around the diverticulum. Before discussing this certain embryological findings are of interest.

Lewis and Thyng found that knob-like diverticula occur with regularity in the embryos of the pig, rabbit, cat, sheep and in man. These were found along the whole of the small intestine but especially in the duodenal region. These outgrowths were found to be similar in nature to those that give rise to the pancreas.

Embryology.—The pancreas in man develops from three outgrowths from the duodenum, one dorsal and two ventral. From the dorsal develops the duct of Santorini and the body of the pancreas and from one ventral bud is developed the duct of Wirsung and the head of the pancreas. The other ventral bud atrophies. If this does not take place is it not possible that a diverticulum may remain? Masses of pancreatic tissue are often found attached to intestinal diverticula. Opie reports a jejunal diverticulum with such a finding, and Falconer a diverticulum of the stomach. Other writers have reported similar occurrences in duodenal diverticula. In the lower vertebrates the pancreas is often represented by numerous digestive cæca. In the salmon, there are a hundred or more of these pouches deposited along the whole length of the duodenum.

ETIOLOGY

Many theories have been advanced as to the etiology of these diverticula, but the general opinion seems to be that they are either directly or indirectly *congenital,* and are likely to enlarge late in life and produce symptoms.

FIG. 5.—This shows a large diverticulum of the third portion of the duodenum.

In support of the congenital theory there have been advanced the following: they have been found:—

(a) In the embryo.

(b) In very young children.

(c) Associated with diverticula in other organs (Case).

(d) In other portions of the bowel and even

FIG. 6.—This shows a diverticulum of the second portion of the duodenum just beyond the bulb.

in the stomach, with portions of pancreatic tissue.

(e) About half of them are found in the region of the ampulla of Vater where the pancreatic ducts are developed from duodenal buds.

(f) One case at least has been reported where the mucous membrane at the apex was thrown into folds (Maclean)—a point against the distention theory. Linsmayer, who made a study of forty-five cases occurring in 1,367 autopsies performed by himself for the special purpose of determining the occurrence and etiology of this condition, considers them congenital only to the extent that pancreatic *anlagen* cause local defects in the musculature and that the diverticula result from age, intestinal atony or increased intraduodenal pressure.

In support of the acquirement theory the following points have been advanced:—

(a) They nearly always occur on the mesenteric side of the duodenum, where the muscular wall is weakened by the passage of the vessels and ducts.

(b) That in the sigmoid they have been found in association with, and above, obstruction due to a new growth.

(c) That they seem to appear and produce symptoms late in life.

(d) That they have been formed experimentally by distending the intestine with water. (Hansemann in 1896).

(e) Keith and Jacks report a case of a diverticulum above an area of partial obstruction in the duodenum.

Keith regards them as diverticular hernias of the mucous membrane through weak portions of the bowel where the vessels pierce the wall. He believes they may be produced by increased pressure within the duodenum in enteroptotic individuals, where partial duodenal obstruction may be produced by a direct drag of the mesentery where it crosses the duodenum or by a sphincteric action of the muscle at the termination of the duodenum which he believes is more important. Others believe that they are produced or enlarged in late adult life, from similar causes, where there is a general lessening in the elasticity and a stretching of all the tissues of the body.

So-called traction diverticula due to adhesions or scarring resulting from an ulcer or cholecystitis have been described and nearly always occur in the first portion. They cannot be regarded as true diverticula but rather as pouchings. Their wall includes all the coats of the bowel. Nagel reports a series of nineteen such cases verified at operation. All were in the first portion. Three of the cases were associated with gall bladder disease. Two were due to the closure of a fistulous tract. Fourteen were due

FIG. 7.—This shows a diverticulum at the duodenal —jejunal flexure.

to ulcer. Carman has reported that they occur in 1 per cent of all duodenal ulcers.

Pathology

As in the case of colonic diverticula, the path-

Fig. 8.—This shows a very large diverticulum of the third portion of the duodenum.

ological changes that may occur are similar to those occurring anywhere else in the digestive tract. Many cases have been reported where gross pathology, at times even causing the death of the patient, either directly or indirectly, has resulted from a diverticulum. Changes may be brought about by stagnation of retained food particles in the diverticulum with resulting infection. There may be gradual migration of organisms and toxins through the sac wall without gross changes in the sac itself. In Maclean's operated case the diverticulum was found imbedded in the pancreas, which was very markedly thickened, and swabs taken from its cut surface, when cultured, showed the presence of *B. coli* and staphylococci. Akerlund (see Case's paper) reported a case in which operation revealed "marked swelling of the duodenal wall bordering the diverticulum while the sac itself held a mass of necrotic pancreatic tissue which had resulted from the extension of the diverticulitis into the pancreatic substance, lying next to the sac."

Case reports a case in which he was unable to remove the diverticulum because of gross pancreatic changes about it. Rosenthal and Bauer have recorded cases of duodenal diverticula "in which the diverticulum was the seat of severe inflammatory changes and simultaneously Vater's papilla was swollen, even its lips glued together with mucus, causing dilatation of the pancreatic and biliary ducts."

Other cases have been recorded where a large poorly draining diverticulum has caused direct pressure on the bile and pancreatic ducts and thus giving rise to secondary changes in the liver and pancreas. Obstruction of the duodenum has occurred from the pressure of a large distended diverticulum. Case quotes such a case of Bauer's which resulted in the death of the patient. Monsarrat in the *British Journal of Surgery*, July, 1926, reports a case of acute perforation of a duodenal diverticulum (of the second part) which was operated upon with complete recovery.

Association With Cancer

W. J. Mayo found carcinoma of the large bowel associated with diverticulosis in 31 per cent of his cases. From this one would expect to find carcinoma arising in duodenal diverticula but there is on record only one such case. Morrison and Feldman report such an occurrence in a diverticulum of the duodenal cap. Heinrich

Fig. 9.—This shows a large diverticulum of the second portion of the duodenum. This also shows a hernia of the diaphragm, the sac containing a portion of the cardiac end of the stomach.

says "the occurrence of aberrant pancreatic tissue in the duodenal mucosa and about the head of the pancreas suggests that certain tumours, especially those involving both duodenal wall and pancreas, may arise from such aberrant

FIG. 10.—This shows a number of diverticula occurring in the same patient, as shown at the arrows.

tissue." Maclean suggests that "as carcinoma is more prone to develop in an organ such as the liver or pancreas, which has become cirrhotic, and that, as cirrhosis is the result of chronic irritation, it is conceivable that, in some cases of cancer at the head of the pancreas, an overlooked diverticulum may have been the exciting factor.

SYMPTOMATOLOGY

Many of these diverticula apparently cause no symptoms. That they may produce severe symptoms has been adequately proved. A number of authors have reported cases operated upon with relief of symptoms. In 1921 Dean Lewis published the report of a case with symptoms simulating a biliary affection which was completely relieved by operation. Butler and Ritvo and Maclean and others have reported similar relief following operation. Symptoms may be due to changes within the sac itself or to secondary changes in the surrounding tissue. There are, however, no pathognomonic symptoms. They often simulate those of right upper quadrant lesions such as gall-bladder disease and duodenal ulcer, but are usually vague and atypical, and the diagnosis cannot be made clinically.

DIAGNOSIS AND ROENTGEN STUDY

The diagnosis can only be made during a roentgen ray examination and is made by means of the opaque meal. The diverticulum announces its presence by the appearance of a localized accumulation of the meal adjacent to the duodenum. Often the barium may be made to enter and leave by manipulation under the fluoroscopic screen.

Demonstration of the diverticulum may be quite difficult. It may not fill at all during the usual observation period, or it may fill and empty so readily that it may escape notice, or it may fill only in certain positions and under pressure. Very careful and repeated fluoroscopic examinations, including those manipulations necessary for the visualization of the whole duodenum, are required if a high percentage of these diverticula are to be demonstrated. The possibility of their presence should always be kept in mind. Many of them are readily visualized, but many more need to be searched for. Considerable information about the diverticulum may be determined during the course of the examination and may be of great importance if the patient comes to operation. The size, shape, position, the filling and emptying times, the position of the ostium and its size, the presence or absence of tenderness may all be observed, as well as its mobility under the palpating hand and its movement, if any, during deep respiration, and the presence or absence of abnormalities of the tissues about the diverticulum.

The differential diagnosis in most cases is not difficult. Calcified glands, gallstones, renal calculi, fæcoliths, bismuth in the colon, or barium

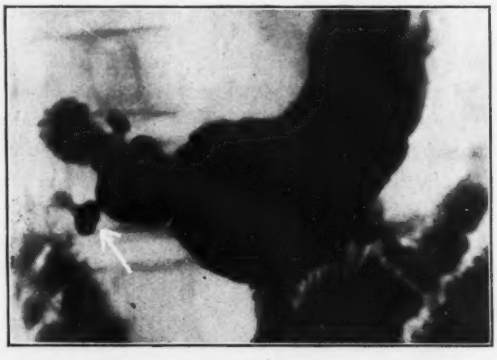

FIG. 11.—This shows a small diverticulum of the "peri-Vaterian" type in a patient who has also a duodenal ulcer.

in the crater of an ulcer on the posterior wall of the stomach, may at first be troublesome. A small diverticulum of the duodenum may simulate the pocket of a penetrating ulcer. Cole states that a diverticulum presents more of a puckered appearance with a small ostium and changes more in appearance from time to time than does a penetrating ulcer. Accessory pockets of perforated duodenal ulcers may also be confusing, and differentiation may be difficult or impossible from the roentgen examination alone. The history may be helpful.

An unusual occurrence, such as the perforation of an ulcer into the gall-bladder, or the passage of a stone from the gall-bladder through into the duodenum, may permit the gall bladder to be visualized. As has been mentioned above pouching of the first portion of the duodenum may occur from scarring due to ulcer or gall-bladder adhesions and should not be considered as real diverticula for they contain all the coats of the bowel and are not true herniations of the mucous membrane.

Treatment

A discussion of treatment is hardly within the bounds of this paper, so that a few words will suffice. As stated above, many, including Cullen, Dean Lewis, Forsell and Keyes, Basch, Erdman and Maclean, have reported relief of symptoms after operations which included excision, invagination of the sac, and gastro-enterostomy. Operation is claimed to be advisable in those cases in which the diverticulum appears to be the cause of symptoms, which are severe enough to warrant the risk, when other methods of treatment have failed, especially if the roentgen study has shown that access to the diverticulum is easy. L. J. Hirschman reports a case of jejunal diverticulum associated with early carcinoma involving the diverticulum and advises the removal of all large diverticula.

Conclusion

Diverticula of the duodenum occur much more commonly than is generally known.

Many do not give rise to symptoms, but numbers of cases on record have done so to a severe degree, even causing death.

In well selected cases operation may be advised with the hope of a cure.

The diagnosis can be made only by means of the x-ray examination, and, if for no other reason, is important in that their recognition, as such, is necessary if mistakes are to be avoided.

Their occurrence and ability to produce symptoms should stimulate further careful clinical and pathological studies.

Bibliography

1. Baldwin, W. M.: *Anat. Record*, 1911, v, 121.
2. Hartung, Adolph: *Radiology*, April, 1925, vol. iv.
3. Merrill, A. S.: *A. I. Roentgenol.*, October, 1925, xiii, 310.
4. Groover, T. A., and Christie, A. C.: *Am. J. Roentgenol.*, 1919, vi, 571.
5. Watkins, W. W.: *Am. J. Roentgenol.*, 1920, vii, 234.
6. Monsarrat, K. W.: *Brit. J. Surg.*, July, 1926, xiv, 179-80.
7. Morrison, Theodore H., and Feldman, Maurice: *Ann. Clin. Med.*, 1925-1926, iv, 493.
8. Nagel, G. W.: *Arch. Surg.*, xi, 534-540.
9. Butler and Ritvo: *Boston M. & S. J.*, April, 1925.
10. Chomel: *Hist. d. l'Acad. roy.*, Par., 1710.
11. Buschi: *Arch. Path. Anat., et Berl.*, 1911, ccvi, 121.
12. Linsmayer: *Verhandl. d. deutsch. path. Gecell.*, 1914, p. 445.
13. Lewis and Thyng: *Am. J. Anat.*, 1908, viii, 505.
14. Falconer: *Lancet*, 1907, i, 1296.
15. Keith: *Lancet*, 1903, i, 639; *Brit. M. J.*, 1918.
16. Cole and Roberts: *Surg., Gynæc. & Obst.*, 1920, xxxi, 376.
17. Basch: *Am. J. M. Sc.*, 1917, cliii, 833-41.
18. Lewis, Dean: *J. Am. M. Ass.*, 1921, lxxvi, 783.
19. Maclean: *Surg., Gynæc. & Obst.*, July, 1923, xxxvii, 6-13.
20. Cullen: *Arch. Surg.*, May, 1921, 542.
21. LeWald, L. I.: *Radiology*. Jan., 1925, iv, No. 1.
22. Case: *J. Am. M. Ass.*, Nov. 27, 1920, lxxv, 1463.
23. *Ibid.*: *Am. J. Roentgenol.*, June, 1916, iii, 314.
24. Stewart: *Am. J. Roentgenol.*, April, 1916, iii, 292.
25. Ritchie and McWhorter: *Surg., Gynæc. & Obst.*, xxv, 485.
26. Wierig, Alfons: *Klin. Wochensch.*, March, 1926, v, 561-2.
27. Rave: *Klin. Wochensch.*, April 9, 1926, v, 655-7.
28. Handel: *Wiener klin. Wochensch.*, August 7, 1924, xxxvii, 776.
29. Robineau and Gally: *Arch. des Maladies de l'appareil Digestif et de la Nutrition*, November, 1926, lxx, 1007-1034.
30. Opie: Diseases of the Pancreas.

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IMMEDIATE AND END-RESULTS OF SUPRAPUBIC PROSTATECTOMY: A CONSIDERATION OF THE FACTORS INVOLVED*

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DURING the last few years, certain changes have occurred in the management of benign hypertrophy of the prostate gland which have resulted in a marked reduction of mortality following the operation of suprapubic prostatectomy, and, ultimately, improvement in function. Prostatic obstruction is no longer regarded merely as a mechanical process localized in its effect to the vesical neck, but as a condition general in its effect on the body as a whole. It is well known that prostatic obstruction, resulting in varying degrees of urinary retention, exerts a direct effect on renal function, not only as a result of obstruction, but because prolonged retention causes ascending infection. The resulting pyelonephritis is usually progressive, and in instances of long standing becomes irreparable. Cardio-vascular disease occupies an important position in the consideration of prostatic obstruction and is exceedingly significant in the immediate and end-results of prostatectomy. Willius has shown that 42 per cent of patients with prostatic obstruction have cardio-vascular disease, and that the incidence of cardio-vascular disease is higher with prostatic obstruction than with many other diseases during similar decades, indicating that the severity of co-existing cardio-vascular disease is increased by persistent urinary obstruction. That renal insufficiency and pre-existing cardio-vascular disease are important causes of death in the management of prostatic obstruction is shown in a recent review of forty-two deaths following suprapubic prostatectomy, ten of which were from uræmia and six from cardio-vascular disease.

Standardization, to a considerable degree, has become possible in the management of prostatic obstruction, and a number of principles have been evolved that merit recognition in their influence on mortality and ultimate functional results. Pre-operative treatment and accurately visualized operative procedures are the keynote to the most successful management of benign prostatic obstruction.

Indications for Operation

The ultimate functional result of prostatectomy bears a distinct relationship to the proper selection of cases. Often it is difficult to determine when benign enlargement of the prostate gland requires surgical intervention. In the early years of prostatic surgery this question was not so difficult. However, as indications for operation have been broadened to be applied before serious cardio-vascular disease has resulted, the early rather than the late manifestations of prostatic obstruction must serve as determining factors for or against operation. Perhaps most, if not all, men past the age of fifty have some enlargement of the prostate. In a review of consecutive histories of a large number of men past the age of fifty, who were examined at the Mayo Clinic for complaints other than genito-urinary, it was found that 58 per cent had urinary symptoms attributable to the prostate gland. Obviously surgical intervention is not advisable in all cases.

The subjective symptoms of pathological changes in the prostate gland are frequency, difficulty, pain, hæmaturia, and incomplete emptying of the bladder. Assuming that the symptoms can be attributed to the prostate, how are they to be interpreted? The first three symptoms, frequency, difficulty and pain, although they are usually present, do not necessarily indicate a surgical lesion of the prostate, but if they alone form the basis of indication for operative procedures the benefits of operation are questionable. These symptoms alone, in the absence of obstruction or residual urine, are usually manifestations of infection

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and are frequently noted in cases of so-called prostatitis, or the inflammatory type of gland; unless there is obstruction or residual urine the symptoms are usually not relieved by prostatectomy. Hæmaturia, excluding the upper portion of the urinary tract as its source, as a rule indicates the presence of intravesical enlargement of the gland, with varices in the overlying mucous membrane. Inability to empty the bladder, and persisting residual urine, are the outstanding and important indications for prostatectomy. However, the absence of residual urine does not constitute a contra-indication to operation if the gland is enlarged and there are other subjective symptoms. With any amount of residual urine, the result of prostatic obstruction, the surgical indications are clear; with frequency, difficulty, pain, and so forth, but with slight enlargement of the gland and no residual urine, the advisability of operation is questionable.

Treatment Preliminary to Operation

Death following prostatectomy has been due to the following causes, in order of frequency: (1) co-existing or pre-existing cardio-vascular, renal, and pulmonary diseases; (2) surgical accidents, such as hæmorrhage, and (3) post-operative complications. In recent years, effort has been directed toward providing factors of safety which tend to eliminate these causes of death. Two types of cases present the greatest hazards in prostatectomy: (1) those in which prolonged urinary retention has resulted in marked renal insufficiency, and acute uræmia and death are readily precipitated by immediate prostatectomy, and (2) those in which the urinary tract is free from infection, only a few ounces of urine being retained as the result of prostatic obstruction, and there is little or no impairment of renal function, a type of case in which general sepsis is likely to be precipitated by immediate prostatectomy. Experience has taught that in the first type the patient may recover from actual or potential uræmia, that renal efficiency may be restored or approach normal, and that the cardio-vascular renal reserve may be increased by a period of careful and adequate pre-operative treatment. In the second type of case the patient may likewise be provided with immunity to infection by the same means.

Recent investigation of the relationship of preliminary treatment to mortality following prostatectomy has definitely established the necessity of preliminary treatment in all cases. In the past, only those patients who were considered poor surgical risks, by virtue of marked renal insufficiency and cardio-vascular disease, were given the advantage of preliminary treatment and of increasing cardio-vascular renal reserve before operation, while patients in excellent physical condition were operated on immediately. In a recent study of mortality and factors influencing mortality in the management of prostatic obstruction, I found that the mortality rate following prostatectomy in the best surgical risks without preparation approaches closely that in the exceedingly poor risks requiring a long period of pre-operative preparation, and twice that in the best surgical risk with the advantage of adequate pre-operative treatment.

The important factor in preliminary treatment is drainage of the bladder. Bugbee and others have directed attention to the dangers attendant on sudden emptying of an acutely or chronically distended bladder. These dangers are lessened by the method of gradual decompression, as described by van Zwallenburg, which is applicable to all cases. In the small percentage of cases in which urethral catheterization cannot be carried out, the method can be applied following cystostomy. The benefits of preliminary treatment are best attained by continuous drainage with urethral or suprapubic catheter rather than by intermittent catheterization. During the period of drainage the bladder may be irrigated to combat co-existing cystitis. Drainage allows recovery of renal function and stabilization of cardio-vascular renal reserve. The length of time that preliminary treatment is necessary depends on the general condition of the patient. It should be continued until the tests of renal function have become stabilized within normal limits. Only under unusual circumstances should prostatectomy be contemplated when the phenolsulphonephthalein return is less than 20 per cent, or the urea content of the blood more than 50 mg. for each 100 c.c. In many instances a period of from ten days to two weeks of preliminary treatment assures the re-

lative safety of prostatectomy. However, if renal insufficiency is marked and the patient is in poor general condition, it is necessary to drain the bladder for months before the operation may be undertaken with any degree of safety. Experience has led to the adoption of the minimum of ten days even in the most favourable cases.

Usually suprapubic prostatectomy is performed in one stage. However, associated lesions of the bladder such as vesical calculi (12 per cent), diverticula (5 to 7 per cent), severe cystitis, marked renal insufficiency requiring prolonged drainage, and senility forbid the uniform adoption of the one-stage operation. Nevertheless, in carefully selected cases drainage of the bladder may be adequately carried out by the urethral catheter, facilitating in 75 per cent of the cases the one-stage visualized operation, which permits the application of the general principles of surgery, that is, exposure, accuracy of conduct, and complete hæmostasis. The effect of drainage of the bladder is enhanced in the presence of co-existing vesical lesions if vesical calculi are removed at preliminary cystostomy and diverticula excised extravesically or transvesically after the method of the late Dr. Geraghty.

Surgical Principles of Prostatectomy Influencing the Results

Changes during recent years in methods of anæsthesia are secondary in importance only to the pre-operative preparation of all patients. Such changes have contributed much to the safety of prostatectomy. The desirability of avoiding the inhalation types of anæsthesia has long been realized. Certainly the burden of general anæsthesia is not lightly borne by patients whose organic reserve is reduced incident to the average age and result of prostatic obstruction. Intraspinal anæsthesia obviates the disadvantages of general anæsthesia and provides complete relaxation and complete anæsthesia of the operative field. However, the reactions incident to disturbances of blood pressure make one question whether it is entirely safe. Labat introduced in this country a method of regional anæsthesia, recently modified by Lundy, which provides complete anæsthesia and possesses none of the disadvantages of general anæsthesia. It is also devoid of the potential dangers of intraspinal administration. Sacral anæsthesia, in skilled hands, rarely requires the supplementary aid of any other anæsthesia.

The type of operation for removal of the prostate gland unquestionably has some bearing on the mortality rate and ultimate functional results. I prefer the one-stage suprapubic prostatectomy, which is applicable in 75 per cent of cases. In the evolution of this operation, it was a common observation that patients who had survived simple cystostomy for retention or removal of vesical calculi and had recovered from the depression, subsequently underwent radical removal of the prostate gland with relatively few deaths. This gave impetus to the two-stage prostatectomy, which is still indispensable if vesical lesions, severe cystitis, marked renal insufficiency, senility, intolerance to the urethral catheter, and trauma to the urethra are associated complications. Prostatectomy, simultaneous with the removal of large vesical calculi and excision of large diverticula in the presence of marked cystitis, is accompanied by a higher mortality rate than the two-stage operation. In my experience 6 per cent of patients without associated vesical lesions are intolerant of drainage by the permanent indwelling catheter and require cystostomy. The two-stage operation is necessary in certain cases to insure the minimal risk, but that it deserves adoption as a routine is questionable. Excellent drainage of the bladder is facilitated in most instances through permanent urethral catheterization. Such drainage limits the surgical procedure to one operation, permits exposure, visualized conduct of the operation, and accurate hæmostasis, so necessary to the best functional results, and the avoidance of surgical accidents. While the two-stage operation is necessary in approximately 25 per cent of cases, it possesses the disadvantage of blind extirpation of the gland which at times results in incomplete removal of adenomas and leaves an irregular vesical neck with mucous membrane tags: this is a potential and often actual source of subsequent obstruction. The technical procedure of the one-stage operation, which has been described (Fig. 1), allows extirpation of the gland under direct vision (Figs. 2 and 3) and excision of redundant mucous membrane which provides a smooth circumference

of the vesical neck (Fig. 4). It is not uncommon, following a two-stage prostatectomy, for obstruction at the vesical neck to develop subsequently and require instrumentation for relief. The one-stage operation permits the application of methods of hæmostasis, and from the stand-

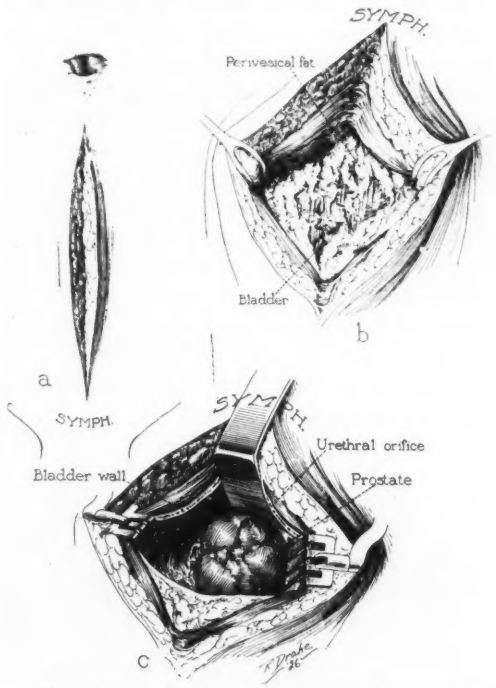

FIG. 1.—One-stage suprapubic prostatectomy: (*a*) Incision extending from just above the symphysis to within four-fifths of the distance to the umbilicus provides adequate exposure of the operative field; (*b*) Distension of the bladder with air or solution is unnecessary for its identification; the retraction upward of the peritoneum and preperitoneal fat exposes the collapsed bladder, readily recognized by its longitudinal muscle fibres; (*c*) Insertion of the bladder retractor allows inspection of the interior of the bladder and enables one to see the entire procedure of removing the gland.

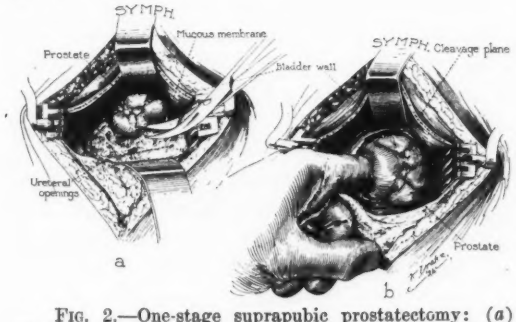

FIG. 2.—One-stage suprapubic prostatectomy: (*a*) The mucous membrane around the internal orifice or that overlying the intravesical portion of the gland is incised with scissors in order to avoid irregular laceration of the mucous membrane in the subsequent enucleation; (*b*) The cleavage plane in adenomatous hypertrophy of the prostate is established in the anterolateral wall of the prostatic urethra, and is carried about the entire circumference of the gland within the capsule.

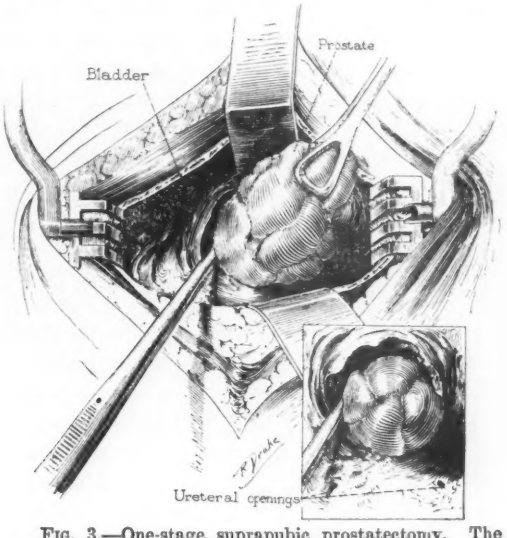

FIG. 3.—One-stage suprapubic prostatectomy. The gland is elevated into the bladder by means of prostatic forceps as the instrumental enucleation proceeds.

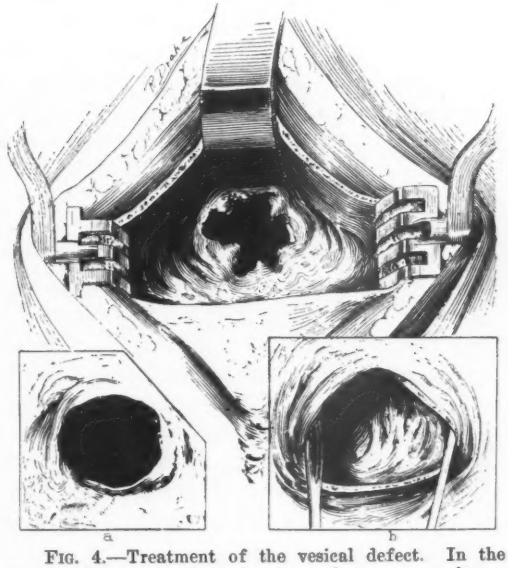

FIG. 4.—Treatment of the vesical defect. In the unexposed operation irregular tags of mucous membrane may persist, to become agglutinated and form a diaphragm with subsequent obstruction at the vesical neck. This is obviated by obtaining the exposure of the one-stage operation and incising the mucous membrane with scissors before the enucleation, or trimming off the tags immediately after removal of the gland. (*a*) At the completion of the operation the neck of the bladder should present a clean-cut circumference devoid of irregular laceration or tags of mucous membrane; (*b*) Inspection of the interior of the prostatic capsule after removal of the gland insures against the oversight of persisting adenomas or fragments of gland tissue.

point of continued or secondary hæmorrhage carries with it a greater degree of safety than the two-stage operation. As a group, the patients on whom a one-stage operation is performed experience better functional results than do those on whom the two-stage is performed. The functional results in terms of symptomatic relief, however, are not so much dependent on the type of operation, barring subsequent obstruction of the vesical neck in the two-stage operation, as on the degree of pyelonephritis. Since the one-stage operation is our choice and is applicable in 75 per cent of cases, and since the two-stage operation is reserved for patients who are poor surgical risks, usually primarily on account of advanced pyelonephritis, it happens that the results from the two-stage operation, under the circumstances of this particular selection of patients, are not as good as with the one-stage operation, nor as good as with the two-stage were it applied to patients who are good surgical risks as well.

Hæmostasis is extremely important in the operation of prostatectomy and bears such a definite relationship to the immediate results in mortality that it merits brief consideration. The procedure has received little consideration in this field of surgery. It has been accepted that the loss of a certain amount of blood is but a part of the procedure and should cause little concern. These patients possess but little resistance to infection and the additional lowering of resistance from continued loss of blood following operation makes them readily susceptible to general sepsis. To conserve resistance demands accurate hæmostasis, and with the hæmostatic methods now available continued bleeding after prostatectomy should rarely occur. Numerous ingenious methods of providing hæmostasis have been advocated. Massage of the prostatic capsule immediately after removal of the gland has, to some extent, controlled bleeding from the interior of the capsule. The capsule has been irrigated with hot liquids, such as boiling water, boric-acid solution and hot bichloride solution. Various tampons inserted into the prostatic capsule, and methods of suturing, have accomplished a certain degree of hæmostasis. Thromboplastic substances, chiefly kephalin, have served to reduce post-operative bleeding. Before the advent of the Hagner bag, and Pilcher's modification of it, probably the most effective means was to pack the prostatic capsule with gauze and allow it to remain in place several days. While gauze has usually been effectual, its effectiveness is the result of the gauze becoming enmeshed in the granulation tissue of the capsule. When it is removed, a variable amount of bleeding is often precipitated and occasionally severe secondary hæmorrhage. The Hagner bag and Pilcher's modification of it filled a distinct need and serve as an excellent means of hæmostasis within the prostatic capsule. The bag is usually adequate in controlling bleeding, not only from the capsule but from the vesical neck. Judd and Cabot were the first to advocate interrupted sutures at the vesical neck to control bleeding, and hæmostasis is most complete when the sutures are used in conjunction with the bag (Fig. 5).

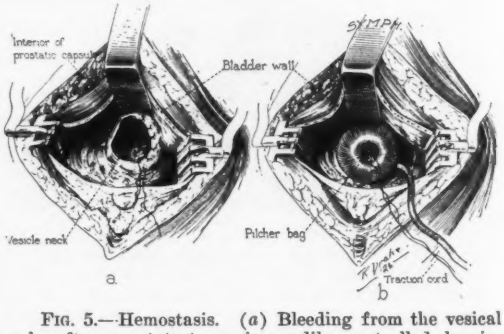

FIG. 5.—Hemostasis. (*a*) Bleeding from the vesical neck after prostatectomy is readily controlled by interrupted sutures; (*b*) The Pilcher bag is not drawn entirely into the prostatic capsule, but is allowed to impinge on the vesical neck. In this position it supplements the sutures; and traction necessary to maintain the bag in place is exerted on the internal sphincter instead of the external sphincter.

The pre-operative preparation of all patients has reduced post-operative complications to a minimum and made convalescence easier and shorter than formerly. The use of regional anæsthesia permits the continuation with little interruption of the pre-operative regimen as regards diet, and the administration of liquids, and so forth. The pre-operative treatment of actual or potential uræmia largely eliminates the probability of post-operative uræmia. It restores the renal reserve to within normal limits, obviating the necessity for post-operative stimulation of elimination by means other than the kidneys, so that the drastic use of cathartics is avoided. A liquid intake of at least 3000 c.c. daily is maintained and in most instances rectal or subcutaneous administration is not required.

Epididymitis occurs in a variable percentage of cases. Its greatest incidence is not during convalescence in the hospital, but after the third month, and is in all probability due to cicatricial contraction around the ejaculatory ducts with resultant retention and infection ascending to the epididymis.

Some difference of opinion exists regarding post-operative irrigation of the bladder. It seems to contribute but little to the welfare of the patient and it may do harm by precipitating secondary bleeding. However, the daily instillation of 1 per cent mercurochrome seems to possess some merit.

Results in the Mayo Clinic Cases

Mortality.—For the purpose of obtaining a fair perspective of the mortality rate it is necessary to consider the work of a number of years. This report therefore, is based on a five-year period, chosen at random from January, 1921, to January, 1926, during which time suprapubic prostatectomy was performed in 995 cases at the Mayo Clinic. This series has been carefully reviewed with regard to the mortality rate, subsequent course, and ultimate function. In several series of cases of 100 each there were no deaths. However, the mortality rate by years has varied from 6.4 per cent in one year to 2.4 per cent in 1925, with an average rate of 4.2 per cent for the five-year period. In this connection it should be stated that previous to January, 1925, pre-operative preparation was carried out in only about 75 per cent of the patients. The remaining 25 per cent of the patients were excellent surgical risks and were operated on without pre-operative preparation. The effect of pre-operative preparation in all cases after January, 1925, became apparent immediately.

The one-stage operation was performed in 783 cases (78.6 per cent) of the series with thirty-four deaths, a mortality rate of 4.3 per cent. In 212 cases the two-stage operation was performed with eight deaths, a mortality rate of 3.7 per cent. This is in contrast with a previous report on an earlier series of cases in which the mortality rate of the two-stage operation was one and a half times as high as the one-stage operation.

Of the forty-two deaths, the causes were as follows: uræmia and renal insufficiency, ten; pulmonary embolism, nine; general sepsis, seven; cardio-vascular disease, six; secondary bleeding, four; pneumonia, three; and bleeding duodenal ulcer, general peritonitis, and erysipelas, one each. Renal insufficiency and uræmia are important factors in cases in which urinary obstruction and retention has existed for a long time. Pulmonary embolism has not occurred as a cause of death since the adoption of pre-operative preparation of all patients. It has continued difficult to combat general sepsis, usually emanating from an acute exacerbation of cysto-ureteropyelonephritis. It would seem that the prostatectomy had little to do with some of the deaths, but these deaths are included in the surgical mortality.

Ultimate Results.—In an effort to determine the course subsequent to operation and the ultimate results, information has been obtained by personal letter, questionnaire, and, in many instances, by re-examination in 951 cases (95.5 per cent) of the series. There were forty-two surgical deaths: eighty-five patients died within five years from various causes, forty-five of whom obtained satisfactory results from the operation. Information regarding results in the others is lacking. Eight hundred and twenty-four patients replied to the questionnaire, which dealt with the symptoms of nocturnal and diurnal frequency, difficulty, pain, control, sexual power, and so forth. Considerable difficulty is experienced in the interpretation of the symptom of frequency pre-operatively and post-operatively. Frequency, when the bladder is over-distended pre-operatively, should not be mistaken for incontinence, nor should the frequency at times persisting post-operatively, as a result of pyelonephritis and generalized infection of the urinary tract present before operation, be accepted as incontinence.

The effect of prostatectomy on frequency was the return to normal of nocturnal urination in 76 per cent of the patients, the majority of whom retain the urine throughout the night. Seventy-four per cent void less than six times during the day. The symptom of pre-operative difficulty of urination was relieved by prostatectomy in 95 per cent of the patients. There is a physiological waning of the sexual power during the prostatic age but there is little reason to believe that the prostatic enlargement

is a causative factor. Only 62.5 per cent of the patients in this series had normal sexual power, the remainder reporting diminished sexual power. Even though the prostate is a sex gland it does not seem that prostatectomy is an important factor in the reduction of sexual power. Twenty-eight per cent of the patients state that the power has been diminished since operation, but the waning of power in the prostatic age is likely to be attributed to any outstanding event in their lives at that time, and should it be prostatectomy, the operation is credited with the change. In contrast, 13.5 per cent of the patients with reduced power before operation experienced a return to normal power after operation. Fifty-eight per cent experienced no change. In other words, questionable impairment of sexual power occurred in 28 per cent.

As regards the functional results of prostatectomy, 54 per cent of patients are entirely relieved of all symptoms, 22.6 per cent are markedly improved, and 14.2 per cent moderately improved. That is, 91 per cent have been benefited by operation. The 9 per cent of patients who did not experience benefit are those who had suffered from obstruction and infection for a long time before operation. Irreparable injury to the kidneys had occurred and re-examination, in many instances, has revealed persistent and progressive pyelonephritis. The results following prostatectomy bear direct relation to the length of time that retention and infection of the urinary tract have been present, and the best functional results are obtained in cases in which prostatectomy is done before pyelonephritis develops.

BIBLIOGRAPHY

1. BUGBEE, HENRY: *Med. J. & Rec.*, 1924, cix, suppl., xxxiii-xxxvi.
2. CABOT, HUGH: *Surg., Gynæc. & Obst.*, 1913, xvii, 689-692.
3. HAGNER, F. R.: *Surg. Gynæc., & Obst.*, 1914, xix, 677-678.
4. HUNT, V. C.: *J. Arkansas Med. Soc.*, 1925, xxii, 101-107.
5. HUNT, V. C.: *California & West. Med.*, 1926, xxv, 325-327.
6. HUNT, V. C.: *Surg., Gynæc. & Obst.*, 1926, xlii, 187-190.
7. HUNT, V. C.: *Surg., Gynæc. & Obst.*, 1926, xliii, 769-780.
8. JUDD, E. S.: *Interstate Med. J.*, 1917, xxiv, 70-75.
9. LABAT, GASTON: Regional anæsthesia, its technique and clinical application, Saunders, Philadelphia, 1922, 496 pp.
10. LUNDY, J. S.: *J. Urol.*, 1927, xvii, 525-556.
11. PILCHER, P. M.: *Surg., Gynæc. & Obst.*, 1917, xxiv, 162-176.
12. WILLIUS, F. A.: *J. Urol.*, 1925, xiii, 337-342.
13. VAN ZWALLENBURG, CORNELIUS: *J. Am. M. Ass.*, 1920, lxxv, 1711-1712.

CERTAIN DIFFICULTIES AND EMERGENCIES OF OBSTETRIC PRACTICE*

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ONE may say that the difficulties and emergencies of obstetric practice begin some time previous to the occurrence of pregnancy, and do not end for at least two months or more postpartum. Following this two months' postpartum period we will classify the patient as gynæcological. It seems convenient, therefore, to consider the difficulties and emergencies of obstetric practice in four groups, namely: the ante-pregnancy period; the ante-natal period; the labour period; and the post-partum period.

It is very gratifying for those of us who are particularly interested in preventive medicine, and I trust this means every one of us, to note how much more frequently patients are consulting us before pregnancy ensues with reference to their physical or mental ability to undertake pregnancy. My patients so far have usually had definite reason for asking advice, yet it is pleasing to find that the general public are more and more realizing the actual value of prevention. In obstetrics we have one of the most fruitful fields for exhibiting the merits of prevention, and not least among these is the period before

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pregnancy is undertaken. These patients usually come to us asking if they are physically strong enough, because they either have, or believe they have, some physical disability, such as a valvular heart lesion or some form of kidney disease. If the patient is found to be perfectly fit, the consultation and examination were certainly well worth the time and money expended. The patient's mind is relieved, often very considerably. If a physical defect is found, she is advised accordingly. The patient with valvular heart disease is advised to proceed with pregnancy providing that the heart muscle has compensated well and is not giving signs or symptoms of failure under the average stress and strain of the daily routine of the patient's life. If the heart muscle is not compensating well under these circumstances, and does not do so with a regulated daily life, this patient should be advised against pregnancy. The patient with chronic kidney disease, is advised against pregnancy. However, if the kidney is functioning well under an average daily diet and work, we may have to qualify such a statement. Osler's dictum is a safe one, "a patient with chronic Bright's disease should not marry. A patient with active pulmonary tuberculosis should be advised not to become pregnant. In the clinically cured cases, I think the patient's ultimate prognosis is much better if she does not become pregnant." For the patient with a definitely small pelvis, one has the opportunity of telling her beforehand that the only possible means of delivering her and getting her a living baby is by Cæsarean section. The border-line cases, with a slightly contracted pelvis, may be told of some of the possibilities at or near term, but as these cases can seldom be well judged until the relationship of the child's head and the pelvic brim is made out, one may leave these until that time comes.

Definite foci of infection should be cleared up as much as possible. Questionable teeth should be x-rayed and dealt with accordingly. Infected tonsils are better out than left. A troublesome appendix should also be removed.

The difficulties presenting during the antenatal period may be considered in two classes, (a) those due to the pregnancy, and, (b) those not due to the pregnancy. These two groups will be conveniently discussed as they occur during the first, second, or last third of pregnancy.

A.—First Third of Pregnancy

1. Difficulties in diagnosis.
2. Toxic manifestations.
3. Uterine displacements.
4. Hæmorrhage.

Second Third of Pregnancy

1. Difficulties in diagnosis.
2. Toxic manifestations.
3. Uterine displacements.
4. Hæmorrhage.
5. Pyelitis.

Final Third of Pregnancy

1. Difficulties in diagnosis.
2. Toxic manifestations.
3. Uterine displacements.
4. Hæmorrhage.

B.—Difficulties not due to Pregnancy

1. Acute infections.
2. Diseases of the circulatory system.
3. Renal diseases.
4. Pulmonary diseases.
5. Surgical emergencies.

It is almost clinically impossible to make a definite diagnosis of uterine pregnancy before the end of the first six weeks. Following this period, one may have to diagnose between pregnancy and a fibrosis uteri or several small fibroids which cause uterine enlargement. In cases of doubt, one is always justified in waiting, and noting at regular intervals the changes in the uterus. If these changes correspond with those of normal pregnancy, one is usually justified in considering the patient pregnant. A pedunculated fibroid, or an ovarian cyst, may be separated from the body of the uterus, and seldom causes much difficulty in making a differential diagnosis.

The toxic conditions which commonly occur during the first third of pregnancy are namely: vomiting of pregnancy; ptyalism; hæmorrhage from the placental site; neuritis; neuralgia; fibrositis and myositis; pruritus; certain skin eruptions.

It is a well established fact now that diet plays a most important part as a cause of many of the so-called toxic disturbances which occur during pregnancy. One of the best examples being the vomiting of pregnancy. In a case of vomiting we first make sure that the vomiting is due to the pregnancy. If so, we should also make sure that a retroverted or retroflexed uterus is not aggravating the condition. Having done this, it is now possible to get pleasing results from carbohydrate feeding. This may have to be carried out intravenously, interstitially, by the bowel, by the mouth, or by some combination of these, depending upon the severity of the vomiting. It seems that prophylaxis here is

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again our most logical course. This is best obtained by overbalancing the diet of each patient from the onset of pregnancy with carbohydrates, and with plenty of fluids.

It seems good practice to make at least one vaginal examination during this period. Should the pregnant uterus be retroverted or retroflexed, the latter by far the most common displacement, it should be put in place and a pessary inserted. A retroverted or retroflexed uterus cannot be replaced at the first attempt; the patient may be allowed home for 24 hours with instructions to carry out certain simple exercises, *e.g.*, assuming the knee-chest position every two hours for ten minutes. Often on the second attempt the uterus is either forced up into place or is easily replaced. If this attempt fails, the patient is anæsthetized and a further endeavour is made. If the uterus is impacted firmly and cannot be replaced *per vaginam* it is well to have the patient's abdomen previously prepared for operation. A laparotomy is done and, with assistance through the vagina, the uterus is brought up into proper position.

Hæmorrhage, occurring during the first third of pregnancy, may mean a threatened or inevitable abortion, extra-uterine pregnancy, or uterine growths, benign or malignant, complicating the pregnancy. The threatened or inevitable abortion rarely gives rise to any particular difficulty or emergency. The extra-uterine pregnancy often constitutes a real emergency. It is best treated by operation when first diagnosed. In extreme cases a blood transfusion just previous to, or at the time of, operation will often be the means of saving life.

Coming now to the middle third of pregnancy, we may still have to deal with difficulty in diagnosis. It is during the fourth month that any real doubt may arise; that is before the patient is feeling life. A differentiation may have to be made between a fibroid, pregnancy, and an ovarian cyst. The cyst is most readily differentiated, as it is usually possible to separate the ovarian cyst from the body of the uterus. If the fibroid is localized or circumscribed the difficulty is not so great. In a generalized fibrotic condition the difficulty is formidable, and often time alone will aid in making the diagnosis a definite one.

The toxic manifestations occurring during this second third of pregnancy are usually not so marked as those occurring during either the first or last third of pregnancy. The nausea and vomiting have usually subsided. Those most frequently complained of now are neuralgia, myositis, and fibrositis. If no other definite cause can be found, I think one is justified in deeming them due to a pregnancy toxæmia. The treatment is one of diet for the most part. Hæmorrhage during the middle third of pregnancy usually means a threatened or inevitable abortion, cervical polypus, placenta prævia, or new growth.

Pyelitis is a fairly common complication of pregnancy. Fortunately most of these cases respond readily to medicinal treatment; *e.g.*, when the urine is acid, we use potassium citrate in 20 gr. doses every four hours until the urine is alkaline. The offending organism is usually the bacillus coli. In obstinate cases one may have to instil argyrol into the pelvis of the kidney or even drain. Occasionally, one is obliged to do a therapeutic abortion for the patient whose condition tends to grow worse, irrespective of all other forms of treatment.

The toxic manifestations which occur during the latter third of pregnancy are mainly pre-eclamptic toxæmias, eclampsia, and accidental hæmorrhage. If a patient is regularly seen by her physician throughout pregnancy it is rarely that she will develop eclampsia. The routine management of pre-eclamptic toxæmia is one chiefly of diet and rest. The patient can be carried along with such treatment until the baby is viable; one may then do induction in those cases in which it would be unwise to carry her further to term.

The treatment of the eclamptic patient near term, with the baby living, requires careful consideration. Generally speaking, I think it wise to use the modified Stroganoff method. The aims are: (a) to eliminate toxins as rapidly as possible through all available channels; (b) to assist in delivery if necessary when the cervix is fully dilated or nearly so; (c) to get the patient into labour as reasonably soon as you can, if she fails to go into labour herself, and then to assist in delivery when the cervix is sufficiently dilated.

Cæsarean section is to be considered for the eclamptic patient, even with the normal pelvis,

provided the pregnancy is full term or nearly so, and the clinical evidence indicates a rather long tedious labour. Such a case would be a primi-parous patient, well over thirty years of age, with a long narrow cervix.

Vaginal bleeding, occurring during the last third of pregnancy, may mean an impending miscarriage or premature labour, placenta prævia, accidental hæmorrhage, or new growth. Having diagnosed the case as one of placenta prævia, one first explains the condition to the patient and the importance of keeping in intimate touch with her physician. If satisfied that it is a case of central placenta prævia, one asks the patient to go to a hospital until she is delivered. There she is kept under close observation until term or as near to it as one can safely get her; then she is delivered by means of Cæsarean section without further vaginal examination. If the case is quite definitely the marginal type of placenta prævia, it is a good prophylaxis to have the patient's blood grouped, and a suitable donor standing by, in case one wishes to transfuse the patient with whole blood just before, during, or following delivery.

The management of revealed accidental hæmorrhage consists mainly in tightly packing the vagina with gauze until the cervix is sufficiently dilated for delivery, and assisting the delivery by the quickest and safest method, usually the application of forceps. The management of the rather rare condition of concealed accidental hæmorrhage usually calls for a Cæsarean section, with or without hysterectomy as one finds necessary. Again, it is a wise prophylaxis to have the patient's blood grouped, and to have a suitable donor standing by, who can be used either during or just after delivery.

A new growth which is occasionally met with is carcinoma of the cervix. If the patient is near term, the treatment would consist of a Cæsarean section with a total hysterectomy, or a Wertheim operation if the patient's condition would admit of such.

To save time, we will omit the acute infections and deal briefly with the others of this group. Heart disease, either valvular or myocardial, or both, is treated for the primary condition, irrespective of the pregnancy. If the patient's condition continues to improve with such management, the pregnancy is allowed to continue to, or near term, when in the more serious cases a Cæsarean section under gas-oxygen anæsthesia is the safest method of delivery. If the patient's condition grows worse under good cardiac management, the pregnancy should be terminated. Pulmonary phthisis in the pregnant patient is serious, and the management of such a patient is similar to the management of a cardiac case; namely, if the patient's condition improves definitely, the pregnancy is allowed to continue; if not, it is interrupted.

A patient with chronic nephritis is well advised not to marry, and if she marries it is better that she should not become pregnant. Should she become pregnant, one treats the chronic nephritis, and if there is no improvement, and particularly if she gets worse, therapeutic abortion should be done. As a rule, in such cases, the abortion should be brought on early.

Among the surgical emergencies, acute appendicitis is fairly common. The treatment is appendectomy always, if a definite diagnosis is made during the first forty-eight hours after the onset. The cases diagnosed later may at times be more safely treated expectantly, providing rupture has not already occurred, when of course drainage must be established, and this may be done either in the abdominal wall or by means of a posterior colpotomy. Acute cholecystitis is best treated conservatively, unless there are definite signs of biliary obstruction, when operation for the removal of the obstruction and drainage of the gall-bladder should be undertaken. Salpingitis complicating pregnancy is treated conservatively, unless there are definite signs of a spreading peritonitis, when drainage is established, preferably by means of a posterior colpotomy.

The difficulties arising after labour begins will now be considered. These are rather varied and numerous, but I propose to deal only with the more common ones, such as prolonged second stage; occipito-posterior cases; breech, transverse and oblique presentations; vaginal hæmorrhage. The most common cause of a prolonged second stage of labour in cases where the mother's pelvis is normal, and the baby is normal, is insufficient flexion. This flexion of the baby's head may be increased by properly exerted pressure *per vaginam*. This must of course be carried out before the head becomes too solidly wedged into the true pelvis. In other

cases, the most common cause is possibly some disproportion between the mother's pelvis and the presenting part of the baby. The proper management of the small pelvis cases is naturally an ante-natal problem. Generally speaking, the final determining factor is the relation of the baby's head to the pelvic brim. The decidedly contracted cases are dealt with by means of Cæsarean section at the time of election. The border line cases may escape Cæsarean section or a traumatic labour by a premature induction of labour.

A safe management of the occipito-posterior cases may be summed up as follows: (1) One may leave the case alone provided that labour is progressing in a satisfactory manner and the condition of the mother and baby is satisfactory; (2) If interference is required, one may manually rotate and leave to nature, or rotate if the child is dead.

The three most common difficulties in breech presentations are: (a) extended arms; (b) extended after-coming head; (c) impacted breech. The management of the extended arms should be prophylactic, preventing extension. If it does occur, one must pass the hand up and deliver, preferably the posterior arm first, then the anterior. In difficult aftercoming-head cases one should be ready to apply forceps before making too many attempts with other methods. Personally, I am using this method more frequently than the usual text-book seems to advise. The impacted breech is dealt with in one of these ways: (a) by hooking a finger around the groin and bringing down one leg; (b) by bringing down a leg with the breech hook; (c) by disengaging the impacted breech and by pushing it upwards into the uterus; then bringing down the anterior leg, and completing the delivery as usual.

The management of transverse or oblique presentation during labour is simple in the early cases, but may be most difficult in cases diagnosed late in labour. In the early cases, one may convert it fairly easily into either a breech or a vertex presentation. In the cases which are diagnosed later in labour, the problem is different and may become one of the most formidable in obstetrics. The points which one must endeavour to make quite certain of are: (a) Is the uterus in a state of tonic contraction? (b) What is the general condition of the mother as regards temperature, pulse, etc.? (c) Is the baby living and seemingly in a reasonable condition? If the condition of the uterus is good and the patient's general condition reasonably good, with fairly normal fœtal heart sounds, one may be justified then in doing an internal podalic version, with the patient quite deeply anæsthetized. If the condition of the patient and the uterus are not good, one should not attempt internal podalic version but resort to decapitation or evisceration and extraction. The operations under these circumstances must be carried out with extreme care and as aseptically as possible.

The management of prolapsed cord is not always simple. I will deal here only with the type of prolapsed cord after rupture of the membranes. It usually accompanies such conditions as mal-presentations, contracted or deformed pelvis, and polyhydramnios. In vertex first cases one may attempt replacing the cord and getting the head down in front of the cord. The head is maintained there manually in a flexed position until it is fixed by the uterine contraction or forceps may be applied. If this fails, one may do an internal podalic version, if circumstances permit. In breech presentations the risks to the baby are less, and usually, with care, the baby is born alive.

ABORTION: ITS PROPHYLAXIS AND TREATMENT

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and

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ABORTION as a medical topic is not new. Celsus attributes many abortions to dysentery, and says, "when dysentery is accompanied by high fever the patient usually dies." Hippocrates, too, considers abortion as more dangerous than birth at full term. Conservation of life and prophylaxis of disease are, however, more recent. The fact that half of the child-bearing women have one or more abortions before the age of 35, and that one in every four or five pregnancies ends in disaster before the end of the third month, gives some idea of the frequency of abortion and the tremendous waste of life. Often, too, an abortion, whether spontaneous or induced, gives the opportunity for a localized gonorrhœa to spread to the tubes and thus precludes the possibility of further pregnancies.

The prophylaxis of abortion may start before conception. Patients with a history of previous abortion require careful examination. If the uterus is found to be retroverted, it may be replaced with a pessary, or, in more severe cases, a suspension may be done, though this must be undertaken with care. If, however, the retroversion is discovered during the early months of pregnancy, an attempt should be made to replace the uterus. The patient should be encouraged to assume the "knee chest" position for 10 minutes two or three times a day. Should this fail, a simple method of replacing the uterus is to insert a toy balloon into the rectum and, with the patient in the "knee chest" position, inflate the balloon by means of a sphygmomanometer bulb. This will usually bring the uterus well out of the pelvis and after the twelfth to fourteenth week the fundus will not fall back.

It should be remembered that a small fibroid, even though not palpable during the early weeks of a pregnancy, may be the cause of repeated abortions. If this is suspected, the injection of lipiodol into the uterus and subsequent skiagraphing of the pelvis will check the diganosis. In certain cases, myomectomy may be tried.

If previous experience has shown that the uterus is unduly irritable, and that there is no cause to which previous abortions may be attributed, exertion, especially at the time of the expected menstruation, should be avoided. The patient should also be warned against intercourse. Occasionally, it may be necessary to keep the patient in bed for several months. When medication is essential viburnum and potassium iodide are at least harmless.

Mall has shown that defects in the germ cells are frequent causes of abortion. Chronic poisonings, such as alcohol and lead, may affect the vitality of the spermatozoon. Chemical contraceptives, too, may so lower its vitality that although fertilization takes place, the product of conception is incapable of normal development.

It should be noted that syphilis, though a frequent cause of premature labour, rarely causes abortion, but a positive Wassermann in the early months of pregnancy, is an indication for antisyphilitic treatment.

The only type of abortion requiring discussion as to treatment is the recent incomplete abortion. A fragment of ovum still adherent to the uterine wall is the invariable cause of hæmorrhage and the starting point for infection. Such fragments must be removed gently and without trauma, particularly to the cervix. The cervix suffers by rapid dilatation, and the lymphatic channels running toward the peritoneum are usually opened up. Oxytocics, such as pituitrin, cause an increase in uterine contractions which, in our opinion, tend to close rather than dilate the cervix. Packing the uterus and cervix with gauze, ½″ to 1″ wide, which has previously been soaked in an oily antiseptic solution such as acriflavine emulsion, will dilate the cervix in a more nearly physio-

logical manner. This pack, which also effectively controls hæmorrhage, may be inserted without anæsthesia. When it is removed 24 hours later under light anæsthesia in the operating room, the cervix will be found to admit the index finger readily. The sterile right hand may then be inserted into the vagina while the index finger explores the uterine cavity. If the uterus is steadied by the left hand from above, fragments of ovum may readily be felt and loosened. When all such tags are detached, they may be removed with ovum forceps. In this way, the cervix receives no trauma, and the interior of the uterus is left clean and smooth, and above all the patient may be assured that the abortion is complete. The use of a curette in recent abortions is to be absolutely condemned. Not only is it uncertain whether the entire cavity of the uterus has been explored but also, owing to the softness of the uterus, perforation is extremely liable to occur. Intra-uterine douches and post-operative uterine packs are both unnecessary and inadvisable. Post-operative care is extremely simple. Small doses of ergot to promote involution is the only medication necessary during the three days in which the patient is kept in bed. She may be discharged on the fourth or fifth day after operation.

In febrile cases, if the patient is bleeding considerably and the cervix is patulous, this method may be used without danger. But, in our experience, most septic abortions are admitted late and they seldom complain of much bleeding. They have a definite palpable pelvic inflammation which requires rest and foreign protein therapy rather than active operative treatment.

That this procedure is not only safer for the patient, but also entails a shorter stay in the hospital, is shown by a review of our cases at the Montreal General Hospital. Contrasting the last 25 cases treated in the above manner, with the last 25 treated by instrumental dilatation and curettage, we find that the former required 5.2 days hospitalization and showed a maximum temperature rise to 99.2,° while the latter group were 9.2 days in the hospital and showed an average morbidity of 100.6.°

To sum up—*Prevention of abortion* includes a careful pelvic examination of patients giving a history of previous abortion, and the correction of defects such as retroversion, uterine polyps, and fibroids. If no cause can be found, a period of rest may be necessary. Chronic poisonings and chemical contraceptives are sometimes responsible for defects in the germ-cells which lead to abortion.

Treatment of abortion must have as its aim "a clean uterus!" This is most readily and most efficiently accomplished by a uterine pack of acriflavine gauze followed by digital exploration of the cavity.

CERTAIN ACUTE PULMONARY COMPLICATIONS OF THE PUERPERIUM, WITH SPECIAL REFERENCE TO LUNG ABSCESS AND OPERATIVE TREATMENT*

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THE puerperal complications which I propose to discuss are the so-called "septic" pneumonia, thrombo-embolism, air embolism, and lung abscess. These lesions are all secondary or metastatic, and in the case of "septic" pneumonia and lung abscess arise from a primary area of sepsis somewhere along the genital pathway, with a pelvic thrombophlebitis as the main contributing factor. Some, though of rare occurrence, are of tragic sequence, such as thrombo-embolism or air embolism, whilst others are of such serious consequence that each alters the outlook in a case of puerperal sepsis, rendering the prognosis extremely grave. Each of these conditions will give us much anxious thought, since the patient will either pass through deep shadows and make a tardy recovery or pass into the

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realms beyond. Each, with the exception of air embolism, bears a close analogy to similar complications seen after abdominal operations, especially those on the pelvic organs. I have not found any reference, however, to massive collapse of the lung in any postpartum records, nor have I, on the other hand, found a case of air embolism following abdominal operations.

On these grounds, and also since operative interference is at times indicated in puerperal thrombo-phlebitis, in lung abscess and even in air embolism, this subject is of interest to the surgeon.

The records of the maternity department of the Calgary General Hospital during a seven year period (1920 to 1926 inclusive) show that among 3,923 labours there were two cases of secondary pneumonia and one case of thrombo-embolism. There were *no* cases of lung abscess or of air embolism. There was, however, one of pleurisy with effusion, but none of empyema. During the same seven year period at the Holy Cross Hospital there were 2,314 accouchements with one case of pneumonia, with multiple embolic phenomena and one case of lung abscess, with preceding pelvic thrombo-phlebitis and lobular pneumonia. (This patient was confined extra-murally and was entered for treatment). There were no records of complicating air embolism nor were there any cases of secondary pleurisy or empyema.

These statistics show that pulmonary complications during the puerperium are of rare occurrence in this part of Alberta.

At the Fifth British Congress of Obstetrics and Gynæcology, held in London in 1925, the London Committee on Puerperal Sepsis presented a report[1] on 231 cases of this nature. Among these pneumonia was noted in 11 instances, and of these 8, or 75 per cent succumbed; no case of pulmonary abscess was reported. At the same meeting the North of England Committee gave a statistical review[2] of 154 cases of puerperal sepsis, of which number there were 9 deaths from pneumonia, with abscess in 6. These were post mortem findings. Of interest, although apart from this discussion, there were 5 deaths from pleurisy and 2 from empyema, also verified at post mortem. In a recent contribution, T. Pearce Williams[3] reviewed all the cases of lung abscess and gangrene of the lung occurring from various causes, including puerperal sepsis, at the Middlesex Hospital, London, between the years 1898 and 1922. These numbered 15 in all, with a mortality rate of 80 per cent. Among them was a solitary instance of puerperal sepsis, complicated by lung abscess, which had a fatal termination. Professor G. Schaanning,[4] of the University Clinic at Oslo, Norway, recently reported a case of puerperal thrombo-phlebitis with lung abscess. There are remarkably few references to this subject in the literature of the past five years. Lilienthal,[5] in his comprehensive work on thoracic surgery states that lung abscess has been known to accompany puerperal infection.

Pulmonary Embolism, or thrombo-embolism, is of less frequent occurrence during the puerperium than following abdominal operations, but nevertheless has the same high mortality. There are comparatively few contributions to this subject, though recently Manning,[6] Salvesen,[7] Young,[8] Spencer,[9] McCullough[10] have reported individual instances.

Air Embolism, around which subject there has centred much discussion, has been dealt with recently by Gough,[11] who reported a post-partum case in which there seems to have been no possibility of infection with Welch's gas forming bacillus.

Primary Acute Lobar pneumonia is a rare puerperal complication according to Whitridge Williams,[12] Sears[13] and others, unless the infection has been present before the time of labour, or after a premature labour induced by the disease itself.

According to Lewis A. Conner[14] there are two classes of *venous thrombosis* occurring during the puerperium: (1) the local infective thromboses beginning in the veins of the infected uterus; (2) the autochthonous, which forms at parts more or less distant from the uterus and nearly always affects the femoral vein. Thrombosis of the pelvic veins is much more frequent, however, and is frequently overlooked. The course by which thrombosis spreads is from the uterine veins to the external iliac or downwards to the femoral vein.

Passing on to the question of thrombo-phlebitis in its relationship to puerperal sepsis, with which it has an intimate connection, I may say that there is always a primary focus of infection located either in a torn perineum, or a rent in the vagina, or a lacerated cervix,

or, as most often happens, somewhere in the wide area of the placental site. This last is the most dangerous of any because of the large expanse which may eventually become infected and owing in great measure to the presence of the venous sinuses through which infection may spread and form secondary lesions. Thus, pelvic thrombo-phlebitis develops by the spread of infection passing through the uterine wall to the parametrium.[15] The bacteria causing this infection are usually certain types of streptococcus, staphylococcus, bacillus coli communis, or pneumococcus.

The most commonly affected group of veins is the one which drains the blood from the body of the uterus and passes into the upper portion of the broad ligament on each side, close to the ovarian artery, to form the ovarian veins. These empty into the inferior vena cava on the right, and on the left, into the left renal vein. Concomitant with the development of a thrombo-phlebitis, there is usually a pelvic cellulitis and lymphangitis.

Once the thrombo-phlebitis has developed, the danger from metastatic or embolic phenomena is obviously apparent, and with the passing of infective emboli into the blood stream distant secondary lesions will occur. The commonest location for such emboli is in the lung, owing to the actual deposit of bacteria producing multiple and patchy lesions. Proof of this, relative to lobular pneumonia and lung abscess, was recently demonstrated by Cutler and Schlueter[16] in the dog where a small mass of known bacteria was placed in a minute segment of a vein and ligatured at both ends. This was inserted into one of the jugular veins, subsequently passing into the pulmonary circulation produced the typical lesions seen post-operatively of lobular pneumonia and lung abscess. Lilienthal[17] remarks that infection of the lung through the blood stream is invariably embolic.

The chief characteristics of the secondary or metastatic pneumonia are: 1. There are usually multiple foci of infection. 2. There may be early involvement of the pleura. 3. The bronchial walls are not directly affected. 4. There may be comparatively few physical signs in the early stages, and possibly the only one on auscultation is a friction rub due to involvement of the pleura. Associated as it is with puerperal sepsis, care must be taken that it is not overlooked.

Later on, signs of consolidation appear, but in some rapidly fatal cases death may ensue before these become apparent. In some instances the heart may reveal murmurs due to endocarditis, or the friction sounds of pericarditis, according to Fairbairn.[18]

Mönckeberg[19] reports a case of a woman of 33 who developed fever on the third day after normal delivery, and pneumococci were found in the lochia but not in the mouth or nose. The midwife who had attended her was found to have chronic left tonsillitis and her sputum contained numerous pneumococci. Pneumococcal pneumonia developed in the parturient, with coincident peritonitis, from which she died on the thirteenth day.

Pulmonary Thrombo-Embolism.—This is, as I have already stated, of rare occurrence during the puerperium. Thus Wermbter,[20] reviewing a series of cases of this character at one of the German clinics, found that the incidence rate was .04 per cent. The mortality rate is equally as high as in surgical practice, which is 90 per cent, according to Lockhart-Mummery.[21] Of attributable causes, manual removal of the placenta and uterine tamponage are given by Schumacher[22] as being most frequently concerned. The origin of the embolus is generally in one of the iliac veins, and in most instances the embolic phenomena occur between the sixth and the tenth day of the puerperium. Occasionally, it develops within a few hours after labour; one of the venous sinuses of the uterus in the region of the placental site is probably where the embolus takes its origin and early departure. In these early cases the embolus is of the so-called aseptic variety. Those of later development originate in a thrombo-phlebitis of one of the pelvic veins as a rule.

As in the case of post-operative pulmonary emboli, there are three groups, *viz.*, (1) The large embolus which completely excludes the pulmonary artery or one of its branches, shutting off the blood supply to one or more lobes of the lung. Death will occur in over 90 per cent of these patients. (2) The moderate sized embolus, which brings about infarction of lung tissue and consolidation with pleuritic symptoms. The mortality rate is from 15-20 per

cent. (3) The small embolus, which gives rise to mild, but characteristic symptoms.

The classical picture of pulmonary thromboembolism is familiar to you—the onset of great suddenness without prior warning, the gripping precordial pain, intense dyspnœa, with air hunger, then sudden collapse and death. Death is produced by the overwhelming strain on the heart as well as by the blocking off of a large area of lung tissue. On the subject of treatment, Lockhart-Mummery[23] deprecates the use of cardiac stimulants and considers vasodilators of value in some cases. One may state positively that if the embolus is large, neither drugs nor any other known means will prevent death. Much might be said along the line of preventive care, such as active limb movements and breathing exercises, commencing early in the puerperium; careful watchfulness of the heart, and digitalization if necessary.

There was one recorded case at the Calgary General Hospital (No. 39730). A multipara of 33 years of age. Pelvic measurements large. Hydramnios present. Child in R.O.P. position. In labour eight hours when the forceps was applied without result; then version was performed, and the head, which was hydrocephalic, was delivered with difficulty. The child weighed 10 lbs. 9 oz. Two hours after labour the patient developed sudden pain in the chest, followed by severe dyspnœa. Rapid respirations—48—cyanosis, with pallor and a pulse rate of 148. A persistent cough developed with expectoration of a frothy, bloody mucus. After four hours the patient's condition began to improve; the pain in the chest disappeared after twelve hours. Cough with rusty sputum continued for about five days. A few days after the onset moist râles could be heard over a limited area at the base of the right lung. This patient finally made a good recovery.

Air Embolism.—There has been much discussion as to whether this serious complication is really due to the presence of air passing into the uterine sinuses, following intra-uterine manipulations in cases of placenta prævia or where rupture of the uterus has occurred. Olhausen,[24] Lesse,[25] Perkins,[26] Roger,[27] and others have reported instances. On the other hand, the careful researches of Welch and Flexner[28] have shown that the bacillus ærogenes capsulatus is sometimes the real factor. So that, when air embolism has been diagnosed, bacteriological examination should be made to exclude infection with Welch's bacillus. According to Blair and McGuigan,[29] the amount of air required to produce death varies greatly, even in similar conditions and in the same and in different species of animals.

When a small quantity of air is introduced into a vein it may be carried through the right heart into the pulmonary circulation and may escape through the alveoli of the lungs and no symptoms ensue.

With larger quantities there is a definite interference with the closure of the auriculoventricular valve. The compressibility of air prevents its being carried on into the pulmonary artery, so that the air is churned back and forth, and, if the quantity is sufficiently large, death is almost instantaneous, as a result of interference with the pulmonary circulation and consequent lack of oxygen to the vital centres. Of great importance, also, is the fact that the right chambers of the heart become acutely dilated. The only essential finding at post mortem is the dilated right heart filled with air, and myocardial degeneration.

In the treatment of this complication, Amussat[30] first advised aspiration of the air from the heart. Senn,[31] Goodridge,[32] and others have proved the feasibility of this procedure experimentally. Blair and McGuigan obtained the best results by injecting 40 to 50 c.c. of normal saline, containing 2 c.c. of 1-1000 to 1-1000 adrenalin chloride, into the right ventricle after aspiration of the air. Gough[33] recently reported a case of true air embolism in a multipara, 25 years of age. When in difficult labour, the forceps was applied, an episiotomy performed, and the child delivered. The patient suddenly collapsed, and the pulse rose to 170 and became thready. Dyspnœa was marked for the first few hours. There was extreme pallor. Later extreme restlessness set in, with respiratory failure, deeper cyanosis, and death. Post mortem examination showed that the right ventricle was dilated with flabby walls. When opened under water the right ventricle was found to contain much free air and frothy blood escaped from it. The pulmonary arteries also contained frothy blood. No thrombi were found in the pulmonary arteries. A careful bacteriological examination revealed no gas forming micro-organisms. The possibility of the occurrence of air embolism is based on well-studied cases like this one of Gough's.

Lung Abscess.—The final complication which I will discuss is lung abscess, which is a formidable one to cope with. It may be overlooked if great care is not taken to watch for signs of

any involvement of the lungs during the course of puerperal sepsis. This lesion develops in the wake of a puerperal thrombo-phlebitis, from which lesion an infective embolus passes into the blood stream to the right heart, thence into the pulmonary circulation. The embolus is usually minute, so that obstruction of one of the larger pulmonary arteries does not occur, and the symptoms produced by large emboli are not present, such as hæmoptysis, dyspnœa, or cyanosis. Such septic emboli are sometimes multiple, producing numerous small or large areas of suppuration in the lung, preceded usually by a lobular type of pneumonia. Of the signs and symptoms of lobular pneumonia I will say little, though the presence of puerperal infection alters the usual early evidences of this disease. With the onset pain may be complained of in one or more areas of the chest. The already elevated septic temperature will mount higher, remitting only a degree or two each day. The pulse becomes accelerated. A dry, unproductive cough makes its appearance. The respirations increase. The physical signs for the first few days may be few in number, until one or more areas of impaired resonance are discovered and, on auscultation, a few subcrepitant râles. When an area of consolidation breaks down as a result of central necrosis and an abscess gradually forms, the patient becomes more septic looking, the face assuming a dusky hue and the lips a cyanotic tinge. The coughing spells are more frequent and intense and the sputum, which has been mucoid, may become tinged with blood. Later, the sputum may be muco-purulent and may have an offensive odour, if any of the pus has found its way into the bronchioles or bronchi.

To verify the diagnosis, a radiographic examination is of much value, and should be made. Total dependence however should not be placed on this means of determination, valuable though it is, in localizing the abscess. The clinical signs are of as much value. Bronchoscopic examination or treatment will seldom be necessary, since, as I have remarked, these puerperal lung abscesses are usually peripheral. Where the abscess is centrally located in the lung, as in some of the post-operative types, about 25 per cent, according to Evarts Graham,[34] heal spontaneously, adequate drainage being brought about by rupture of the abscess into a large bronchus. Postural treatment will be of assistance in these cases.

The impelling necessity for drainage in a peripheral lung absence has been emphasized by Graham and Singer,[35] so that operative measures hold out the best chances for relieving this condition. This operation in puerperal, as well as in post-operative, patients should not however be undertaken too early, and before the abscess has developed, since there is great danger in having to traverse a considerable œdematous portion of lung. Needless to say, the exact location of the abscess is a requisite before the operation is performed.

Gas-oxygen is the safest anæsthetic to use, though regional nerve blocking with novocain (½ of 1 per cent) offers no contra-indication if the patient is not apprehensive. Briefly, the operation may be done in two stages. The first, in which a thoracotomy is performed, removing one or more ribs including the periosteum. The pleural cavity is opened. A few chromic catgut sutures are inserted through healthy lung and parietal pleura to hold the abscess close to the outer wound. After a few days the abscess may be evacuated and a good sized drainage tube inserted. During the first stage if adhesions are found over the abscess area and the parietal pleura the second portion of the operation may be carried out at once. The following case record illustrates what has already been said concerning this complication.

Holy Cross Hospital. (Case No. 5-10167). Mrs. L. L., aged 18; primipara; married one year. Diagnosis: puerperal septicæmia; pelvic thrombo-phlebitis; lobular pneumonia; abscess of right lung (upper lobe). Complaints: weakness, chilliness, vomiting, fever, headache, pain in lower abdomen (left. Family history: negative. Personal history: prior to labour the appetite was poor; the bowels constipated; sleep was disturbed and restless; and a vaginal discharge was present. Nothing of particular interest in the past history.

History of present illness: Twenty-four hours after an accidental fall backwards on the floor the patient gave birth to a female child two and a half weeks before the expected time. She was attended by her physician in the country, who told me that there were no vaginal examinations made prior to delivery, and that the labour was a comparatively short one. There was a tear of the cervix uteri and one of the vaginal inlet on the left side of small dimensions. No sutures were inserted in either tear. Within twenty-four hours after delivery the patient developed severe pain in the left lower abdomen, followed by chills and elevation of temperature, which rose to 104° F. within twenty-four hours.

Five days after labour I saw her, in consultation with her physician. She was then complaining of continuous pain in the left iliac and hypogastric

regions. A bimanual recto-abdominal examination revealed a marked induration in the lower portion of the left broad ligament, with much tenderness on pressure. The uterus was poorly contracted, moderately enlarged, and showed immobility to the left. There was a purulent sanguineous discharge from the vagina. There was also tenderness along the left great saphenous vein from the knee upwards, and in the left femoral vein as far as the inguinal ligament.

On entrance to the Holy Cross Hospital on the tenth day of her illness, the patient was in a poor condition. Temperature 103° F.; pulse 122; respirations 30; abdomen distended; vomiting occurring at intervals; an area of tenderness existed in mid-hypogastrium; pain has been present in right upper chest for several days; there was a dry unproductive cough; blood pressure was systolic 118, diastolic 78. Water was ordered in large amounts by mouth; with liquid diet; 5 per cent glucose injections were given per rectum; 20 c.cm. of a solution of acri-flavine (1 in 250) were given daily intravenously for five days, without any apparent benefit.

Two days later, impaired resonance, and broncho-vesicular breath sounds, were noted in the upper lobe of the right lung towards the apex, and more in evidence posteriorly. The cough became more frequent and the sputum muco-purulent with traces of blood. Pneumococci were found in the sputum. A small area of impaired resonance with diminished breath sounds appeared in the infraclavicular region of the left lung. During the next three days the area of dullness in the right upper lobe increased more posteriorly than anteriorly, extending down to the medial end of the spine of the scapula. The breath sounds in this area became muffled. The temperature during these days remitted only about a degree, and the pulse and respirations increased.

I considered the possibility of lung abscess, located more posteriorly than anteriorly in the upper right lobe, and asked for a radiographic examination. Dr. D. H. McGuffin's x-ray report was as follows: "In the upper lobe of the right lung there is a density which has the appearance of pneumonia, but in having the patient examined in the sitting position a definite clear area is seen in the apical region. This signifies fluid. Therefore, we conclude that there is a collection of fluid, probably abscess circumscribed by pneumonic lung."

Blood examinations on the second, third, and fifth days after admission to the hospital showed a well-marked secondary anæmia. On the latter day, the red cells were 2,432,000; hæmoglobin 45 per cent; leucocytes 18,600; colour index 1; polymorphonuclear cells 87 per cent.

Bacteriological examinations of the exudate from (a) the introitus vaginæ. (b) posterior vaginal fornix. (c) the cervical canal, showed in direct smear in each, pus cells, Gram positive cocci, and Gram negative bacilli; no gonococci. Cultures from the blood gave negative results.

On the seventh day after admission, her pulse rose to 140, respirations 32. Her general condition was poor. I decided to operate. No special preparation was made. Gas oxygen anæsthesia was administered by Dr. J. L. Allen. Resection of the third and fourth ribs was carried out under a 2½ inch paravertebral incision two inches from the vertebral spines. The periosteum was denuded from the ribs. The pleural cavity was opened and the convexity of the abscess was found to reach almost to the posterior parietal layer of pleura. Gauze packing was gently inserted around the pleural opening and over the area of the abscess, leaving a small area of exposed visceral pleura over the abscess. A large sized needle was passed into the abscess from which pus flowed freely. The opening was dilated with forceps and a finger. About four ounces of pus were evacuated. A 2/3 inch drainage tube was inserted into the abscess cavity for drainage and fixed to the skin. The wound drained freely and no empyema resulted.

This patient made an excellent recovery following operation, and left the hospital three and a half weeks later. Subsequent to operation, a patch of lobular pneumonia developed in the other lung in the left mid-axillary line which gradually cleared up.

In conclusion, I would say that puerperal sepsis, with secondary lobular pneumonia or lung abscess, will require all the skill we possess to combat. There is no specific in the treatment of the concomitant septicæmia. I believe that it is a waste of time to use intravenous medications. I place great dependence on giving the patient the benefit of open air and sunlight, careful feeding, and large amounts of water by mouth.

REFERENCES

1. ANDREWS, H. R., MACLEAN, SIR E. J., BOURNE, A., and others, *Brit. M. J.*, 1925, 783.
2. BALL, W. B., CHISHOLM, J., DOUGAL, and others, *Brit. M. J.*, 1925, 783.
3. WILLIAMS, T. PEARCE, *Lancet*, Feb., 1926, ccx, 336.
4. SCHAANNING, G., *Norsk. Mag. F. Langevidensk*, Apr., 1925.
5. LILIENTHAL, H., Thoracic Surgery, 1926, vol. ii, 221-222.
6. MANNING, J. J., *Brit. M. J.*, Jan. 15, 1927.
7. SALVESEN, C. J., *Ibid.*, Nov. 6, 1926, p. 835.
8. YOUNG, W. J., *Ibid.*, Nov. 6, 1926, p. 835.
9. SPENCER, F. D., *Ibid.*, Nov. 27, 1926, p. 987.
10. MCCULLOUGH, T. B., *Ibid.*, Nov. 6, 1926, p. 835.
11. GOUGH, J. A., *Surg., Gynæc. & Obst.*, July, 1924, vol. xxxix.
12. WILLIAMS, W., Obstetrics, 1920, 4th Ed., p. 994.
13. SHEARS, P., Obstetrics, normal and operative, 1916, p. 729.
14. CONNOR, L. A., Nelson's Living Medicine, 1920, v, 577.
15. BERKELEY, C., Midwifery by ten teachers, 1917, pp. 526-529.
16. CUTLER, E. C., AND SCHLUETER, S., *Ann. Surg.*, lxxxiv, 256-270.
17. LILIENTHAL, H., *loc. cit.*
18. FAIRBAIRN, J. M., *Pract. Encyl. of Mid. & Dis. of Women*, 1921, p. 160.
19. MÖNCKEBERG, C., *Gynæc. et Obst.*, Paris, 6, No. 4, October, 1922.
20. WERMBTER, F., *Zentralbl. f. Gyn.*, No. 28, July 14, 1925.
21. LOCKHART-MUMMERY, P., *Brit. M. J.*, 1924, ii, 850.
22. SCHUMACHER, P., *Zentralbl. f. Gyn.*, Jan. 31, 1927.
23. LOCKHART-MUMMERY, P., *loc. cit.*
24. OLHAUSEN, *Monat. f. Geburtsch.*, 1864, xxiv, 350-374.
25. LESSE, *Zeit. f. Geburtsch u. Gyn.*, 1896, xxxv, 184-191.
26. PERKINS, *Boston M. & S. J.*, Feb., 1897, cxxxvi, 154-156.
27. ROGER, *Thèse de Paris*, 1896.
28. WELCH, W. H., AND FLEXNER, S., *J. Exper. M.*, l, 533.
29. BLAIR AND MCGUIGAN, *Ann. Surg.*, lii, 473.
30. AMUSSAT, *Bull. Acad. de Med.*, Paris, l, 394.
31. SENN, N. T., *Tr. Am. Surg. Ass.*, iii, 197.
32. GOODRIDGE, M., *Am. J. M. Sc.*, cxxiv, 461.
33. GOUGH, J. A., *Surg., Gynæc. & Obst.*, July, 1924, xxxix, 27-31.
34. GRAHAM, E. A., *Ann. Surg.*, Aug., 1927, lxxxvi, 174-181.
35. GRAHAM, E. A., AND SINGER, M., *loc. cit.*

A CONSERVATIVE TREATMENT FOR CHRONIC ENDOCERVICITIS*

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I AM in hope that this paper will prove of some interest to you this evening, because it is a discussion of treatment which may prove more or less practical, and a treatment, moreover, of a very common ailment. Chronic endocervicitis is, perhaps, the commonest ailment to which female flesh is heir, and is a condition which nearly every one of us treats frequently. Further, is it not a condition that has, as often as not, proved a source of grief and dissatisfaction to ourselves and our patient as regards treatment?

I wish to state most emphatically at the very outset that the treatment here offered is not considered a complete substitute for amputation. Amputation has, and perhaps always will have, a very real place in the treatment of chronic endocervicitis. But insofar as amputation is a somewhat radical procedure at best and may cause serious complications, and insofar as chronic endocervicitis as a rule seldom demands emergency measures, it is felt that this conservative treatment is well worth a trial before resorting to the knife.

For some time certain writers have been endeavouring at intervals to stimulate interest in the neck of the uterus. It has seemed to those privileged to visit portions of the country that there is in many places a marked lack of respect for the cervix. This disrespect is, perhaps, to be expected. I cannot remember as an undergraduate that very much emphasis was placed on the cervix uteri. I think little attempt is made to give the undergraduate that attitude of respect, almost reverence, that is so necessary to treatment. Sturmdorff speaks of it as merely "the neck of the womb," a passage-way of decidedly passive interest. A search made for me by the Library Research Department of the American College of Surgeons, reveals the fact that every recognized text-book in the language, whether anatomical, histological, physiological, pathological, or clinical, is content to describe the uterus in detail and allow the student to consider the cervix as subservient and merely adjunct. Small wonder then for the present attitude. It is urged upon us. In a former paper[1] I discussed the cervix as a separate organ, so highly specialized as to border on the mysterious, and performing a function indispensable to the continuation of the race. That function was based on anatomical and physiological principles. I attempted to show that the cervix is a sphincter, not a true anatomical sphincter, but a physiological one. It is contended that the sphincter idea in treatment of the cervix is the proper attitude, as it will stimulate a conservative tendency rather than a radical one.

In cases of chronic endocervicitis before the menopause, the amputation treatment is often so radical as to be in many cases a real menace to subsequent pregnancies, and this for two reasons; (1) because the fine sphincter mechanism may be destroyed, and (2) because the circular scar of operation, which cannot be avoided, will undoubtedly complicate a subsequent labour. The low-grade connective tissue of the scar will not dilate but it will tear. In other words, the amputation treatment, before the menopause, is sometimes worse than the disease.

Furthermore, it is true that those cases of chronic endocervicitis whose etiology dates from a previous labour may doubtless be cured by amputation. The infection followed the unavoidable trauma. But what of that vast number of cases whose origin dates from a gonorrhœal infection? What about those "footprints on the sands" that are invariably there at some stage of the acute period for all to see? One can readily foresee the futility of cleansing a well of infected water when the immediate neighbourhood of the well is known to be infectious. An amputation of the cervix for chronic endocervicitis, without first giving careful and thorough treatment to the glands

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of Bartholin and Skene, is so futile as to border on stupidity. The cervical stump will, of necessity, become re-infected, and the radical treatment is worse than useless. Those who believe that amputation is a sure cure for endocervicitis are those with an unfortunate experience still awaiting them.

Now, to get away from radical measures as much as possible in our attempt to cure chronic endocervicitis, it is necessary to offer a substitute along conservative lines. This conservative treatment must, of necessity, be a very real treatment, with unquestionably satisfactory and permanent results, if it is to compete with radical amputation. Amputation, of course, undoubtedly cures in a great many cases.

The treatment here detailed is the one used by the writer in private practice during the past two years, and is of necessity limited as to the number of cases. It is the method first suggested by Nassauer, of Germany, and introduced and exploited in this country by Gellhorn.[3] It is based on a scientific foundation, and is not without a generous modicum of common sense.

Most of the time-honoured methods of cervical treatment are done away with, because it is believed they not only are of no value, but are of decided harm. For instance, the persistent and everlasting application of strong antiseptics to the cervical canal, the daily or twice daily, vaginal douche, and the inevitable tampon, are considered to do more harm than good. The antiseptic does not reach the seat of trouble, but rather acts as an irritant. The douches keep up a warm, damp environment, in which bacteria can the better thrive and multiply. The tampon accomplishes nothing as a medicament, but rather interferes with Nature's effort, *i.e.*, the daily discharge of infected debris.

Nassauer[4] in 1909 advised the use of a hygroscopic powder in the vagina as a basis of treatment for chronic endocervicitis. Later, Hunner and Dickinson[5] suggested the use of electrocautery in those cases of marked erosion of the cervix. It is a combination of the two that has brought about the most satisfactory results in treatment.

In every case presenting itself one must look carefully to the history and make careful study of Bartholin's glands, Skene's tubules, the uterus, and the tubes. Any sign of disease in either of the glands is best attacked with the cautery and thoroughly destroyed. In the tubes we know that active infection can seldom be demonstrated in chronic tubal disease.

Treatment

The cervix is delivered between the blades of a large bivalve speculum and it is advisable to lay emphasis on a *good large* speculum at the start. One must have a decent-sized field in which to work. Sufficient light is essential, but this is usually obtained when a large enough field is exposed. All instruments are thoroughly sterilized to begin with, but no real attempt is made to establish operating-room aseptic technique in the office. Gloves are worn for the operator's protection as much as the patient's.

The cervix, cul-de-sac, and vaginal walls are wiped clean of discharge with cotton wool. A short cotton applicator on a sponge stick removes discharge from the cervical canal. The cervix and vagina and between the blades of the speculum are then painted thoroughly with mercurochrome 2 per cent. The speculum is slowly turned in the vagina and areas so exposed painted, until the entire vaginal wall has been painted while on the stretch. This step is considered important, (1) because there undoubtedly is an accompanying vaginitis with endocervicitis and discharge, and (2) we now have a clean antiseptic field in which to work.

The next step is slowly and very carefully to dilate the cervical canal. As we have warned before in previous articles,[2] this dilating of the cervix is not without danger and every care should be taken. We do not use any of the well known uterine dilators, but a simple uterine dressing forceps. After dilating the canal an applicator of cotton is soaked with mercurochrome 2 per cent and placed well up in the canal and allowed to remain about 2 minutes. We are now ready for the powder.

The powder we use is

Kaolin	2 parts
Soda bicarb.	1 part

Kaolin is an inert hygroscopic silicate of aluminum. Its action is simple. It dries up all secretions and so inhibits bacterial growth. As Gellhorn says, "it mummifies bacteria". As kaolin is almost insoluble, one might wonder

about its subsequent removal. In fact, it is said that Nassauer first advised douching the next day to remove the powder, thus partially defeating the objective. It is found that the addition of soda bicarbonate relieves us of any worry on that score. When used with kaolin the whole thing completely disappears from the vagina in 24-36 hours.

The instrument by which the powder is used is called "Nassauer's siccator" (Fig. 1). It is

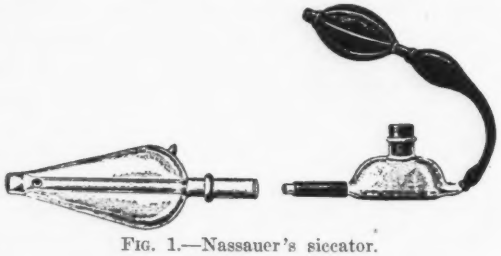

FIG. 1.—Nassauer's siccator.

an ingenious device, so arranged that the vagina is first ballooned with air thus unfolding the mucosa, and at the same time the powder is distributed evenly throughout that organ. The siccator is an inexpensive glass instrument which can be bought from any surgical supply house.

One point in the use of the siccator is, we think, well worthy of mention. When ready for its use, before removing the speculum and while the cervix is still between the blades of the speculum, take the siccator and blow a goodly quantity of powder *immediately into the cervical canal.* Then remove the speculum and apply the siccator between the labia and pump. The instrument will do the rest. The powder chamber is completely filled before beginning the treatment and we try to empty the whole contents into the vagina. The treatment is now complete and the patient gets three such treatments a week. One of the most unfortunate factors one has to deal with in using the powder treatment is the rapidity with which the discharge disappears. This, coupled with the fact that quite often we are dealing with women whose mentality is not high, makes it hard to persuade them to keep on with the treatment. Unfortunately, many are quite sure they are cured after the first week, which is far from true. We warn most of our patients in advance that the disappearance of the discharge is no criterion of the progress of the treatment.

As the discharge disappears, attention is paid to the degree of erosion existing. In many of the gonorrhœal cases that are not of long standing, no erosion is seen. In those cases of long standing discharge dating from a labour there is almost invariably hypertrophy and erosion. Erosion is, of course, merely infected mucous membrane from the cervical canal. This mucous membrane is extruded into the vagina by the eversion of the previously infected and hypertrophied external os. It is reasonable to suppose then that erosion will not be cured while eversion is present and eversion cannot naturally disappear until we have cleaned up at least some of the hypertrophy. Furthermore, vaginal discharge from chronic endocervicitis can not be permanently cured while there is left an infected area of cervical mucous membrane. We must then invariably attack and eradicate the erosion if present, or we are ultimately defeated.

The electrocautery is admirably suited for this phase of the work. So essential is this instrument in work on the cervix that one might well say "with it we may succeed, without it we cannot". The cautery generally used is that commonly used by nose and throat men for cautery work. It is used to best advantage toward the latter part of the treatment. The cervix and vagina are treated with mercurochrome exactly as in preparation for the powder treatment. No anæsthetic of any kind is necessary. The cervix is gently but firmly dilated, swabbed, and the cautery knife carried well up into the canal while still cold. The heat is turned on with the thermostat set until we get a "cherry red" heat, (this having been determined by experiment with the knife before placing it in the canal.) The knife is carried slowly and firmly, straight to the limit of the erosion toward 12 o'clock and to a depth that is through the mucous membrane and into the supporting structures of the cervix to a slight extent. This process is repeated toward 6, 8, 10, 2 and 4 o'clock; six times in all.

Criticism may be offered that the cautery grooves are too many and too deep. It seems most important to say that they are many and deep for various reasons:—

1. By so doing the cauterization does not

have to be repeated. The work is done and the erosion will positively disappear.

2. The scars so formed cannot interfere to any appreciable extent with subsequent labours. They are linear, after all are very fine when healed, and in the long axis of the cervix, not circular as in amputation.

3. The cautery grooves so formed seem to act as drains for the removal of excess lymph, bacteria, and debris from blocked up channels and ducts, and to materially aid the cervix in its return to normal.

4. The slow passage of the cherry red cautery causes a radiation of heat into the deep tissues of the cervix. This is of twofold value: (a) extinction of bacteria in the deepest glands, (b) hyperæmia to all parts of the cervix.

5. The rôle of erosion in the etiology of cancer in this region is receiving more and more emphasis. In view of this consideration, we believe it wisdom to be as thorough as possible in the use of the cautery.

The possibility of hæmorrhage following this treatment is, of course, quite real, but experience has shown that such a thing has happened once in the writer's cases. It is our practice to place a good-sized lambswool boro-glycerine tampon firmly against the cervix following the operation, to be removed on rising the next morning. This is the only tampon used in the whole procedure.

Following the cautery treatment there will be a week of return of the discharge in quantity, then it gradually lessens, and it is but a watery discharge two weeks after operation when the patient returns. The powder treatment are again given for about four times, then the intervals are lengthened to weekly, and monthly, and then stopped.

The procedure is not a cure-all by any means. All that is claimed for it is that it will unquestionably improve the great majority of cases, and, in my opinion, will positively cure a large percentage. I cannot speak in terms of 5 year cures which I believe is usual, but I do know of persons treated two years ago who are entirely free from discharge and backache, who pronounce themselves cured and are satisfied.

It will be noticed that no attempt has been made to describe in scientific language what happens in the healing process. I confess that after more or less diligent search I have not been able to satisfy myself as to just what does happen. The situation is not so unique, however, in medicine. This much can be said generally. The treatment is more passive in character than active. It does not so much actively destroy infection as it inhibits its growth. It mummifies bacteria, which is a roundabout method of destruction.

In conclusion, it is hoped that, in general, a little more consideration and respect may be accorded an organ whose treatment, taken the continent over, borders on abuse. After all, the cervix is in a remarkably strategic position. It is the gateway to the citadel, the barrier between the aseptic and the ever septic, the the dividing line between things mundane and the great unknown. It accepts or rejects morbid bacteria or the vital sperm seemingly at will. We try our best to dictate to it, but after all with little avail. Without its protection the uterus and ovary lose all their romance and much of their use. Their major function, creation, is lost.

Let us at least try and approach the treatment of the cervix with that attitude of respect which it really deserves. By so doing, I believe, we shall become more and more conservative in our treatment.

References

1. Blair, *Surg., Gynæc. & Obst.*, Oct., 1925, p. 473.
2. Blair, *Canad. M. Ass. J.*, 1926, xvi, 1028-32.
3. Gellhorn, *Bull. Van. Med. Ass.*, 1927, iii, 157.
4. Nassauer, *Muench. mediz. Wochenschr.*, 1909, No. 15.
5. Dickinson, *Am. J. Obst. & Gynæc.*, Dec., 1921, ii, 600.

XUM

PYELITIS IN PREGNANCY

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BY pyelitis is meant inflammation of the pelvis of the kidney and the upper part of the ureter. This condition is supposed to have been mentioned in Smellie's Midwifery, which was published in 1752. Rayer described it in detail in 1842, and Kaltenbach showed the connection between pyelitis and pregnancy in 1871. Reblaub reported several cases in 1892 and discussed the treatment. Since that time many papers have been written on the subject.

Several explanations have been given to account for pyelitis in pregnancy. The right side is more frequently affected than the left. Pressure of the pregnant uterus on the ureter is supposed to have some effect, and, as the uterus is more often inclined to the right side, this may account for the more frequent involvement of the right side. Pressure of the head of the child on the ureter is also mentioned, while some think that the congestion and swelling of the bladder mucosa might tend to close the ureteral orifice. Most authorities agree that there is practically always stasis in the ureter before this condition comes on. It occurs most frequently about the fifth month, but may come on at any time during the pregnancy or puerperium.

In pregnancy one may assume that there is some degree of stasis present. Hirsch of Munich found 96 cases of dilated ureters in 130 autopsies in pregnant women. Pollack found 35 cases of dilated ureters in 130 autopsies in pregnant women. Kretschmer of Chicago has found dilatation of the ureters in a certain number of pregnant women, that did not have any signs of pyelitis. Hunner of Baltimore thinks that many cases of pyelitis are caused by ureteral stricture.

The *B. coli* is the organism that most frequently causes pyelitis but many other organisms may be present. Kidd of London collected 140 cases of pyelitis and found the *B. coli* present 117 times, the staphylococcus present seven times, the gonococcus twice, the proteus bacillus once, para-Malta fever once; in nine cases no organisms were found.

There is some difference of opinion about the route of the infection, but most observers think that the infection is blood-borne in the majority of cases. Some think that it is an ascending infection from the bladder getting to the kidney directly up the ureter or by way of the lymphatics of the ureter. Others think that the infection comes by way of the lymphatics from the bowel. Weibel claims that there is direct connection between the lymphatics of the cæcum and ascending colon and the kidney.

Among the conditions that might have a bearing on the causation of pyelitis may be mentioned the following predisposing factors:

1. *Foci of Infection*:
   a. Abscesses of teeth, infected tonsils and sinuses; chronic ear disease.
   b. Gastro-intestinal conditions such as constipation, diarrhœa, fissure, and fistula-in-ano.
   c. Gall bladder disease and appendicitis.
2. *Conditions that Cause a Decrease in Kidney Resistance to Organisms that may be Filtering Through It*:
   a. Nephritis.
   b. Arteriosclerosis.
   c. Stone in the kidney.
3. *Conditions that Cause Urinary Stasis*:
   a. Stone in the ureter.
   b. Stricture in the ureter.
   c. Hydro-ureter.
   d. Pregnancy.
4. *Conditions that Cause Decrease of General Resistance*:
   a. Over-exertion.
   b. Exposure to cold, wet weather.

The disease may come on so gradually that there may not be any symptoms present excepting some bladder disturbances, such as frequent urination with or without pain. In the severe cases the disease may be ushered in by a chill followed by a high temperature and increased pulse rate. There may be pain over one or both kidneys, and, on examination, tenderness is usually present in the lumbo-costal angle.

Very often cystitis is diagnosed and much valuable time is lost before treatment is begun. Appendicitis is sometimes diagnosed and, in the puerperium, a rise in temperature may be

thought to be due to a puerperal infection, when a pyelitis may be the cause of the trouble. It has been confused with typhoid fever.

A careful examination of a catheter specimen of urine will show the presence of a large number of pus cells. This, along with a careful physical examination, would make the diagnosis certain. A culture of the catheter specimen should always be made in order to find out the type of organism that is causing the disease.

There are various methods used in treating this condition. These patients should be put in bed and given plenty of fluids to drink. Alkalies will be found very beneficial in the majority of cases. One drachm of soda bicarbonate every three hours may be given until the urine is alkaline and then enough given to maintain this alkalinity. Some prefer potassium citrate, which may be given up to 60 grains every two hours until the urine is alkaline. The urine should be kept alkaline for two weeks and should be tested out several times a day. The bowels must be kept moving regularly.

Postural treatment is of great advantage. The knee-chest position is commonly used though in the later months of pregnancy this is not feasible. If only one side is affected the patient is advised to lie on the opposite side as much as possible.

After the alkalies have been administered for two weeks, then hexamethylenamine 45-60 grains per day may be given. With this should be given acid sodium phosphate up to 45 grains to maintain the acidity of the urine. This treatment should be kept up for six weeks. For those cases caused by the staphylococcus, hexylresorcinol has been successfully used. It is not as efficient in cases where the *B. coli* is the causative organism.

If alkalinization does not cause the temperature to drop very soon, then it is best to catheterize the ureters and perhaps irrigate the pelvis of the kidney with an antiseptic. Some men do this in every case, but I can not see the necessity of this, as the majority of patients will get better without it.

A continuous type of temperature demands other treatment. Catheterization of the ureters will relieve any obstruction that may be present. In some cases it is best to leave the ureteral catheter in the ureter for twenty-four hours. If this treatment does not cause the temperature to come down, it always means that there is damage to the kidney. In this case it is better to open up through a loin incision, and then it can be decided whether a nephrotomy or a nephrectomy may be advisable. In some cases a nephrectomy has been done and pregnancy has gone on to term.

The prophylaxis of this condition will come to a large extent under pre-natal care. A careful history early in pregnancy may determine the fact that the patient had a pyelitis in the past, for many of these cases are not primary, but the flare-up of an old hydroureter, which may not have been giving rise to symptoms; or the history may point to the existence of an old ureteral stricture, which is bound to cause trouble as pregnancy advances, or may discover unaccountable attacks of fever in childhood which may have been the starting point of the pyelitis. If these are suspected, a catheter specimen of urine should be taken and examined microscopically for evidence of pus. Then a careful physical examination should be made to find any focus of infection either in the teeth, tonsils, sinuses, or in the intestinal tract, and if found these conditions should be promptly attended to.

The importance of drinking water freely should be impressed on the patient as well as the maintenance of moderate activity during her pregnancy. Unquestionably constipation may be a predisposing factor in this disease. If these points are attended to, the development of pyelitis will be less likely to occur.

XUM

A STUDY OF ONE HUNDRED AND SEVENTY-FIVE CASES OF TYPHOID FEVER IN CHILDREN, OCCURRING DURING THE RECENT EPIDEMIC IN MONTREAL*

By Saul J. Usher, M.D.

Montreal

ABOUT six months ago, during the first week of March, 1927, the city of Montreal was visited by an epidemic of typhoid fever, which lasted for three months. Many of the cases were hospitalized, and as a great proportion of the patients were children, an excellent opportunity was presented for making a detailed study of the disease in children. There have been many analyses of typhoid fever in children by various authors, but, for the most part, they have been of sporadic cases, extending over a period of years. I have had the opportunity of observing throughout the course of their illness 116 patients, and of examining the records of 59 others, making in all a total of 175 consecutive cases occurring in persons under 15 years.

This epidemic has been described as being the severest transmitted through milk, there being approximately 5,000 cases with 538 deaths. The cause of the epidemic began operating about February 15th, reached its maximum about March 5th, continued high until March 18th, and then declined rapidly. It is probable that there was a complete cessation of the main current of infection from March 27th to April 20th, when there was a recrudescence, with a rapid decline about May 6th. The cases reported with onsets subsequent to May 25th were in decreasing proportion among persons exposed to the infected milk, and in increasing proportion among persons exposed to previous cases. No evidence was obtained to suggest that the water supply or sewerage system operated in the spread of the epidemic. The official records showed that a very large proportion of the patients gave a history of drinking milk from one of the large dairies supplying about one-eighth of the population. During the recrudescence of the epidemic the characteristics of the disease did not change, the same observations being made as to its virulence and the age of the patients as during the first part of the epidemic.

The distribution by age showed that children were affected in much larger numbers than adults, about 46 per cent of the total number of cases being under 15 years. The proportion of hospitalized patients was a little over 33 per cent of the total number. Of the 175 children in this series 3 were under the age of 2 years, the youngest being 9 months; 69 were between the ages of 2 and 5 years; 67 between 6 and 10 years; and 36 between 11 and 14 inclusive. It is significant of the milk-borne character of the epidemic that so many children under 5 years were infected. There were in the total number 94 male and 81 female children. In 42 instances other members of the family were also attacked (24 per cent). In several of these cases, the whole family, parents and children, were stricken. The milk supply was definitely ascertained in 128 cases, and of these 97 (75 per cent) were found to be taking milk from one dairy plant. This was the same dairy which was held responsible by the health authorities for the causation of the epidemic.

Type of Onset

The onset was in the main fairly rapid, there being 18 cases (10 per cent) with an abrupt onset, 83 (47 per cent) with a fairly rapid onset, and 72 (41 per cent) with a gradual onset. During an outbreak of typhoid fever in a children's hospital, where the exact time could be noted, Cushing[1] found the onset abrupt in the majority, with high fever appearing within twelve hours.

Table I shows the various symptoms of the onset, with their frequency. In those patients in whom early study was possible, the temperature was found to rise rapidly. The diarrhœa was slight or moderate, and never required any special medication. Although vomiting was reported frequently, it was never a marked symptom. General complaints of malaise, fatigue,

* From the Children's Memorial Hospital and the Pædiatric Division of the Montreal General Hospital.

TABLE I

Symptoms of Onset	*Number of Cases*	*Per Cent*
Fever	150	85
Headache	101	57
Loss of Appetite	86	49
General Malaise	70	40
Vomiting	63	36
Abdominal Pains	51	29.1
Diarrhœa	45	25
Constipation	35	20
Epistaxis	30	17.1
Cough	29	16.6
Drowsiness	27	15.4
Muscular Pains	18	10
Chills	16	9.1
Delirium	13	7.4
Sore Throat	7	4
Convulsions	1	0.6

lassitude or weakness, were frequently noted. Headache was usually considered by the patient as part of the feeling of general malaise. Cough was never a marked symptom. Epistaxis was notable by its infrequency as compared with its occurrence in adults. Two-thirds of the cases were in older children. Distension of the abdomen was never mentioned. Abdominal pain was not infrequent, usually being diffuse and associated with some tenderness. Of the patients in whom delirium was present, 5 were under 5 years, 2 between 5 and 10 years, and 6 between 11 and 14 years inclusive. In one child of 12 months there was some meningismus at the onset, but this lasted a short time, and the disease ran a mild course. Convulsions were noted in an infant of 9 months whose onset was rapid, with high fever, vomiting, and cough. The convulsions were repeated once during the course of the disease and there was a slight cough present. The course was a moderately severe one, as the infant developed a bilateral suppurative otitis and a pyelitis. The temperature remained high for 14 days, and gradually fell to normal during the following 13 days. The recovery was complete. According to Crozer Griffith,[2] convulsions are rare, even during infancy. This is in sharp contrast to the condition seen at the onset of other acute infections. Muscular pains were complained of in 10 per cent of the children and included stiff neck and pains in limbs, general soreness, and backache.

The onset in the majority of the cases was abrupt or moderately rapid; the younger the child the more rapid appeared to be the onset as a rule. The symptoms of the onset consisted chiefly of fever, loss of appetite, headache, vomiting, general malaise, abdominal pain and diarrhœa; less often, constipation, cough and epistaxis.

Symptoms of the Developed Attack

These may be said to date from the time the fever reached its height. The digestive and nervous symptoms predominated (see Table II).

TABLE II

Symptoms of the Attack	*Number of Cases*	*Per Cent*
Enlarged Spleen	138	78.8
Rose Spots	131	74.8
Delirium	54	30.8
Cough	40	22.8
Abdominal Distension	38	21.7
Slight	17	9.7
Moderate	15	8.5
Marked	6	3.4
Diarrhœa	37	21.1
Irritability	37	21.1
Apathy	16	9.1
Heart Murmur	13	7.4
Incontinence	12	6.8
Epistaxis	12	6.8
Vomiting	11	6.2
Sore Throat	5	2.8
Loss of Appetite	5	2.8
Rhinitis	3	1.7
Convulsions	2	1.1

A coated tongue was noted in nearly all the cases. The edges and tip of the tongue were generally red and clean. With the exception of a few of the older children, the tongue was never fissured, nor was there any appearance of sordes, characteristic of the typhoid state as seen in adults. Loss of appetite was noteworthy by reason of its infrequency, the children being quite willing to take milk in order to allay the thirst which was often present. Vomiting was also infrequent, and in none of the cases was it a threatening symptom. All of the patients showing incontinence were either very toxic or delirious. In very few instances was the diarrhœa severe, and it rarely lasted longer than a week or ten days. Constipation occurred in the majority of cases, as shown by the number which needed enemas. All of the patients with abdominal distension improved spontaneously, or responded to treatment, with the exception of one case in which the distension was marked and persisted for several weeks.

Of the respiratory symptoms, the most frequent was cough. In ten, a definite bronchitis was present, mild for the most part. Epistaxis occurred chiefly in older children.

XUM

Circulatory disturbances were uncommon and treatment was rarely required except in the very toxic cases. The pulse was only moderately quickened, the rate varying usually from 90 to 120. A pulse rate of 120, with a temperature of 103° to 104° F., in children up to ten years, was a common figure in cases of moderate severity. Not infrequently, a soft systolic murmur was heard at the apex, and, less frequently over the base during the course of the illness.

Nervous symptoms were frequently noted during the course of the disease, though there was little of the marked somnolence or the delirium noted in adults. Restlessness, irritability, and fretfulness were noted mostly in the younger children. A condition of dulness, apathy or listlessness was recorded in some of the older ones. Delirium occurred during the height of the fever, and rarely needed special treatment. It was usually of a mild nocturnal, character. Convulsions occurred in two infants, and both died. In one, a female child of 19 months, the onset was rapid, with fever, vomiting and diarrhœa. There was some vomiting and a slight cough during the course of her illness, and her colour was poor. She ran a high fever, and developed a bilateral suppurative otitis media, finally dying on the 30th day of her illness, from the toxæmia. In the other child, a male, aged 22 months, there was also a history of rapid onset, with fever and vomiting, poor appetite and restlessness. He also developed a bilateral suppurative otitis media, and was drowsy and toxic during the illness, running a high fever for 21 days, when he died in a state of acidosis. The white count was raised in both of these cases, being 19,400 in the former and 23,800 in the latter.

A summary of the temperature findings is shown in Table III. By a high temperature during the course is meant fever of 103° or over; moderate temperature, varying between 101° and 103°; mild temperature, usually below 101°, and subsiding within a week or ten days. The temperature in the majority of cases was remittent during the height of fever, falling from 1 to 2 degrees in the morning as compared with the temperature of the previous evening, and lasting, on an average, about two weeks. There was a gradual fall of temperature in the great majority of cases, extending over a period of

TABLE III

Temperature	*Number of Cases*	*Per Cent*
Initial Rise:		
Gradual	77	44
Rapid	98	56
Course:		
High	70	40
Moderate	97	55.4
Mild	8	4.5
Fall:		
Gradual	157	89.7
More Rapid	12	6.8
Critical	6	3.4
Total Duration:		
Over 3 weeks	90	51.4
Under 3 weeks	52	29.7
Under 2 weeks	33	18.8
Average Duration in Days: 25.		

10 to 14 days. Frequently the temperature became normal within 3 or 4 days from the time it started to decline. A critical fall within 24 hours was noted in only 6 cases. Slight recrudescences of temperature were noted not infrequently. In one case, a child aged two and one-half years, who was toxic and delirious during the course of her illness, and had run a high and irregular temperature for 30 days, there were occasional sharp rises of temperature, varying from 103° to 105°, which persisted until the 55th day of her illness without evident cause. The heart sounds were weak during the height of her fever, and at one time, on the 19th day of her illness, she stopped breathing, and artificial respiration was resorted to. Eventually she made a complete recovery. In 8 cases, after the pyrexia had passed, the temperature remained persistently subnormal. The total duration of fever in this series was prolonged, on account of the numerous complications occurring during the disease. The average duration was 25 days. Whiting[3] found an average of 24 days in his series. In the group of cases up to 5 years, the average duration was 20.7 days; from 5 to 9 years, 22.8 days; and from 10 to 14 years, 29.3 days. In Morse's[4] series, the average duration in 75 cases of from 5 to 10 years was 21 days, and in 202 cases from 10 to 15 years, it was 25 days.

In most of the cases the typhoid roseola was scanty, and was seen chiefly over the abdomen and lower back. In one case the spots were profuse enough to give the impression of a generalized rash. In one case, in which the roseola was well marked, a profuse desquamation of the

skin over the abdomen and back took place. Of other cutaneous manifestations, herpes of the lips was observed in 3 instances; petechiæ over the abdomen in 1; and the urticaria in 1. Splenic enlargement was determined in all cases by palpation.

Laboratory Findings

See Table IV. The cases with negative Widal reactions showed typical symptoms in other respects. Of the positive reactions, 59 per cent of the 152 cases gave a positive Widal reaction within the first 10 days. A leukocyte estimation was made in 168 cases; of these 74 per cent showed a count under 10,000. There were numerous instances in which complications had little, if any, effect on the white count. A blood culture was done on 71 cases, and in no instance was the paratyphoid bacillus A or B found. The average day of illness on which a positive blood culture was obtained was the 8th day. The majority of the patients, however, did not enter the hospital before the end of the first week of their illness. A culture of the stools was taken in 75 patients. Of the cases showing typhoid bacilli in the stools, a negative culture was usually obtained by the 30th day of the illness. The cholesterol content in the whole blood was determined by Goldbloom and Gottlieb[5] in 24 cases at the Children's Memorial Hospital. Fifteen of these determinations were made on acute cases, and 13 on convalescent patients. (See Chart I). The cholesterol was found to be definitely increased in both, more so in the acute cases. The fall to normal after recovery was very gradual. (See Chart II). In no other type of acute infection in Goldbloom and Gottlieb's series was the cholesterol content so high. The urine was examined in 140 cases, and found to be negative for albumin in 108. In only 10 cases was there a considerable amount of albumin present, and these were mostly all severe, toxic cases. Hyaline casts were found in 4 cases, and pus cells in 3. In the majority of cases where indican was looked for, it was found to be present at some stage of the illness, but its presence had no relation to abdominal distension, diarrhœa, or constipation. An electrocardiogram was taken in 8 patients, four of whom were severely ill. All of them showed regular rhythm and normal A-V. conduction time.

TABLE IV

Laboratory Findings	*Number of Cases*	*Per Cent*
Widal Reaction:	166	
Positive	152	91
1–6 days	24	15.7
7–10 days	67	44
11–15 days	36	23.6
16–20 days	15	9.8
21–40 days	10	6.5
Negative	14	9
Leukocyte Count:	168	
2000– 5000	21	12.5
5000–10000	104	61.9
10000–15000	33	19.6
15000–30000	10	5.9
Blood Culture:	71	
Positive	50	70.4
Negative	21	29.6
Stool Culture	75	
Positive	13	17.3
Negative	62	82.7

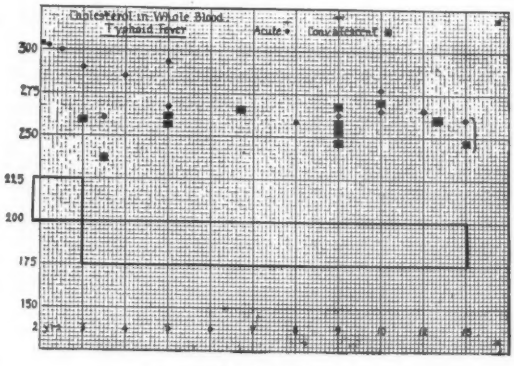

CHART I

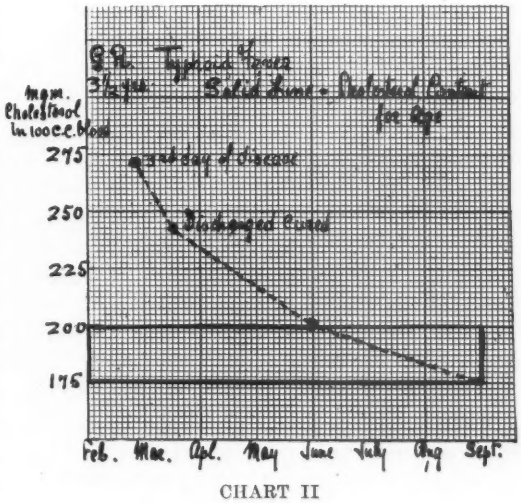

CHART II

General Conclusions Regarding the Symptoms of the Attack

The nervous and digestive symptoms predominated. The nervous symptoms on the whole were those of excitation, rather than depression. Over half the cases were either very restless and irritable, or mildly delirious and irrational. Convulsions were noted twice, both times in infants; both cases ended fatally. Prostration was seldom great, and the typhoid state of the adult was seen only occasionally. Of the digestive symptoms, coating of the tongue was of common occurrence, decided loss of appetite was uncommon, and vomiting was comparatively infrequent. Diarrhœa was present at some time during the course of the illness in about one-fifth of the series, but was seldom severe or prolonged. Constipation was more frequent, and many of the children required enemas. Abdominal distension was fairly frequent, but seldom distressing. Abdominal pain was occasionally complained of. Of respiratory symptoms, cough was common, but seldom of any severity, and epistaxis was comparatively infrequent. The heart and pulse were seldom much involved, and then only in the severest cases, and the pulse rate was only moderately accelerated. The course of the temperature was not very characteristic. The rise was usually fairly rapid, and the temperature in the majority of cases remained moderately high and slightly remittent for about two weeks, after this it became irregular or intermittent, and subsided gradually. In the case of the children under 5 years, the fall was not infrequently rapid. The total duration of the fever varied according to the age period; the older the child, the longer was the duration of fever. Splenic enlargement and the typhoid roseola were present in most of the cases. The Widal reaction was positive in nearly all; three-fourths of the patients gave a leukocyte count under 10,000. There was a positive blood culture for typhoid in 70 per cent. The blood cholesterol was found to be much raised above normal, making only a gradual fall during convalescence. The urine was entirely negative in the great majority of the children shown; a few showed a small amount of albumin and rarely casts. Indican was usually found when looked for.

Complications

These were very numerous; there was a marked tendency for suppurative processes to develop. Seventy-seven cases (44 per cent) showed complications of some kind. These are enumerated in order of frequency in Table V.

TABLE V

Complications	*Number of Case*	*Per Cent*
Suppurative Otitis Media	42	24
Furunculosis	19	10.8
Abscesses	9	5.1
Infections	5	2.9
Intestinal Hæmorrhage	5	2.9
Intestinal Perforation	4	2.3
Mastoiditis	4	2.3
Pyelitis	3	1.7
Acute Vaginitis	2	1.1
Parotitis (non-suppurative)	2	1.1
Typhoid psychosis	2	1.1
Pharyngitis	2	1.1
Ulcerative Laryngitis	2	1.1
Sensory Neuritis	2	1.1
Suppurative Arthritis of Hip with Pathological Dislocation of Femur	2	1.1
Chorea	1	0.5
Myalgia of Hip	1	0.5
Peritonitis	1	0.5
Acute Fibrinous Pleurisy	1	0.5

Of the patients showing sensory neuritis, there was one case with tender toes and one with bilateral peripheral neuritis. In those showing infections, two were on the fingers, one on the scalp, one, gangrene of the arm, and one, ulcer of the arm. Of the abscesses, two were on the hip, one on the neck, one para-anal, one alveolar, one submandibular, one on the jaw; one pararectal, and one submaxillary. Of the five cases with hæmorrhage in this series, 3 were uncomplicated and two were followed by perforation. All of them were toxic and delirious during their course, and ran a high temperature, and with the exception of one case, they all had epistaxis in addition to hæmorrhage from the bowels. Of the three uncomplicated cases, one was a boy of 13 years, who died on the 15th day of his illness; the second one was a girl of 4 years, who died on the 16th day; and the third one was a boy of 14 years, who died on the 18th day. Of the two cases with perforation, one was a boy of 10 years, who showed marked distension during his illness, and died on the 37th day with generalized peritonitis. He was not operated upon. The other case was a boy of 9 years who was operated upon on the 20th day, and a perforated cæcum and peritonitis

were found. He died 5 days later. There were two cases with perforation and no hæmorrhage. One was in a female child of 4 years, who complained of pains in the legs and over the pubic region, with some dysuria, and was operated upon on the 8th day of her illness. At operation punctate hæmorrhages were visible over the parietal peritoneum, and there was a very small perforation about one inch above the ileo-cæcal valve, which had been covered over by omentum. She recovered after a very stormy convalescence. The other case was a boy of 8½ years, who had been ill for three weeks, with fever and marked distension for two weeks. He was admitted to the hospital in a semi-comatose state with his abdomen rigid and very tender. He had been vomiting for the previous 36 hours. At operation a generalized peritonitis following a perforation in the ileum close to the cæcum was found. He died on the following day. The one case with peritonitis alone was in a female child of 7 years, who was operated upon on the 38th day of her illness for what was thought to be an intestinal perforation. There was a good recovery. Setbon,[6] in a study of intestinal perforation in children, found an incidence of 1.7 per cent in 1506 cases. There was an incidence of 2.3 per cent in this series. Morse[4] and Whiting[3] had no cases in their series. Blackader[7] and Whiting[3] also reported no cases of hæmorrhage.

Relapse

This occurred in only three instances (1.7 per cent). A reinfection usually occurs in about 8 per cent of cases, and most often from the 14th to the 17th day after the temperature of the first attack has reached normal, according to Griffith.[8] In this series, the relapses were milder and shorter on the whole than the original attack, and occurred on the average 8 days after the temperature of the first attack had subsided.

Post Mortem Lesions

Autopsies were done on eight of the twelve patients who died. The post mortem findings in the older children did not vary from those in the adults. In the younger children, there were found enlarged spleen and mesenteric glands, with swollen Peyer's patches and solitary follicles, but with very superficial or no ulceration of the small intestine. This is in striking contrast to the severity of the general symptoms, and is probably due to the fact that the disease at this early age is more of a general than a local infection. A terminal bronchopneumonia was found in seven of the eight autopsies made. In one case, which developed severe laryngeal symptoms before death, and in which a tracheotomy had been performed, the larynx showed a small amount of fibrinous exudate spread over the epiglottis and vocal cords, with œdema, producing almost complete occlusion. In another case, in which the patient had passed considerable blood before death, an ulcer was found in the ileum close to the cæcum, containing a small blood clot, which was apparently on the site of an eroded vessel. A very distended gall-bladder was found in a male of 14 years, who had had some intestinal hæmorrhage, and died of a terminal pneumonia. No bile could be expressed from the ducts.

Prognosis

This is given in Table VI. In classifying the degree of illness, the height and duration of the temperature, the course of the illness, and the complications were all taken into account. From the table it can readily be seen that this epidemic was a severe one. This is also borne out by the mortality figures. The statistics given in text-books are usually 4 to 5 per cent. Of the patients who died, seven were male and five female children. The figures given out by the city of Montreal for the total epidemic from February 1st to September 1st were 10.7 per cent in 4,997 cases. The mortality under 5 years was 7 per cent in 514 cases; from 5 to 10 years, 3.7 per cent in 932 cases; from 10 to 15 years, 6 per cent in 888 cases. Thus, in 2,334 cases under 15 years, there was a mortality of 5.3 per cent. These mortality figures, when compared with Table VI are all definitely lower, probably because the severest cases were, as a rule, sent into the hospital. The ages and causes of death

TABLE VI

Prognosis	*Number of Cases*	*Per Cent*
Very Mild	3	1.7
Mild	46	26.3
Moderate	71	40.5
Severe	55	31.5
Total Mortality	12	6.8
1–5 years (in 51 cases)	4	7.8
5–10 years (in 76 cases)	4	5.2
10–15 years (in 48 cases)	4	8.3

were as follows: three cases at 2 years, one of which died from œdema of the larynx and terminal bronchopneumonia; one from toxæmia and terminal acidosis; and one from a cause undetermined. This last one was a very rachitic, undernourished female baby, who ran a moderate course, the temperature subsiding to normal on the 17th day, after a paracentesis of both ear drums had been made. The ears discharged slightly, and the temperature remained normal for 9 days, when convulsions set in. A bilateral paracentesis was again done, but no pus was obtained. The temperature rose during the next 4 days to 107°, preceding death in coma. The spinal fluid was under pressure when examined a few days before death, and there were 210 cells with a faint trace of globulin. Smear and culture were negative. No permission for an autopsy could be obtained. One child of 4 years died of toxæmia; one of 5 years from an acute septic laryngitis with toxæmia and terminal bronchopneumonia; one of 6 years with toxæmia, in whom an early pericarditis was found post mortem; three, aged 8 years, 9 years and 10 years respectively, with perforation, peritonitis and terminal bronchopneumonia; one of 11 years with toxæmia and terminal bronchopneumonia; one of 13 years, and one of 14 years, with hæmorrhage and terminal bronchopneumonia.

Treatment

The treatment employed was largely symptomatic. The use of hydrotherapeutic measures was systematically followed, sponging being usually preferred. In the Montreal General Hospital, the Brand baths were given twice or three times a day to older children who had high temperatures and were very toxic. It was felt that they were very useful in selected cases, helping to combat the toxæmia. Diarrhœa never needed treatment. Cardiac stimulation was sometimes required in the severer cases. Intravenous glucose saline (10 per cent) was given in five of the very toxic cases, with a temporary improvement in the majority, the patients appearing brighter, and the temperature falling slightly. It proved of value as a supporting measure in selected cases. Intravenous transfusions were given to those patients who were passing a good deal of blood, but aside from perhaps prolonging life, it had no curative effect. Where the blood loss was slight, intramuscular injections of a small quantity of the patient's own blood seemed to be of value. Small doses of urotropin were given three times a day in an attempt to free the urine of typhoid bacilli. Liquid paraffin was given to those showing any signs of constipation. Very few of the cases with abdominal distension required any active treatment. *B. acidophilus* was given to see whether it would have any effect on the distension. Buttermilk was first thought of, but most of the children past the age of infancy refused it. A broth culture of *B. acidophilus* was prepared, and a teaspoon given three times a day to fifteen patients with distension. All of them showed partial or absolute relief in a few days, with the exception of one child who had marked distension which persisted for several weeks, while at the same time her temperature remained high. The culture seemed to have no effect on the constipation, or in clearing the indican from the urine. A high caloric fluid diet was given in the acute cases, changing to soft and then full diet as soon as possible.

I wish to express my thanks to Dr. H. B. Cushing and Dr. L. M. Lindsay of the Children's Memorial Hospital and to Dr. A. B. Chandler of the Montreal General Hospital, for having placed at my disposal the material for this series, and also to Dr. H. B. Cushing and Dr. S. G. Ross of the Royal Victoria Hospital for allowing me the use of their records.

Bibliography

1. Cushing, H. B., Can. Soc. for Study of Dis. of Children, 2, 1924.
2. Griffith, J. P. Crozer, *Arch. Pædiat.*, 1912, xxix, 565.
3. Whiting, H. S., *Canad. M. Ass. J.*, 1922, xii, 531.
4. Morse, J. L., *Boston M. & S. J.*, 1896, cxxxiv, 205.
5. Goldbloom, A., and Gottlieb, R., *Canad. M. Ass. J.*, Nov., 1927, p. 1333.
6. Setbon, *Thèse de Paris*, 1902.
7. Blackader, A. D., *Arch. Pædiat.*, 1900, xvii, 641.
8. Griffith's Diseases of Infants and Children, 1927, i, 460.

HEREDITARY ABNORMALITIES OF THE EYE*

VII. Inheritable Defects Involving Eye Muscles, Refraction, etc.

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Strabismus

BOTH convergent and divergent squint show a definite tendency toward being inherited, Reber[26] estimating that at least 68 per cent of cases gave a history of heredity. The convergent squint was found to be much more common than the divergent variety. Landon[13] reported the history of a family which exhibited a convergent squint of the right eye through four generations, (Fig. 33). It seems to be due to a dominant factor, for it was transmitted in the direct line of descent, and affected both sexes, and was transmitted by both fathers and mothers to sons and daughters.

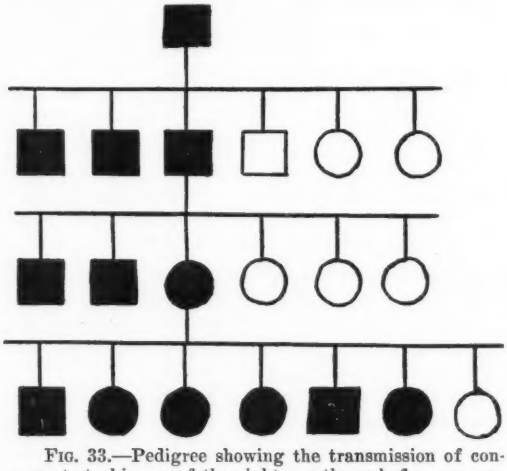

Fig. 33.—Pedigree showing the transmission of convergent strabismus of the right eye through four generations, acting as a unit dominant character. After Landon.

On the other hand, Reber[26] records a family of six brothers, in three of whom there was myopia, and in two of them, also a divergent strabismus. Of the remaining three, one exhibited a low grade hypermetropia with compound astigmatism, but with normal muscle balance. His wife's eyes were similar to his own, but their three sons showed the defects present in their paternal uncles, namely, myopia and strabismus. Such a pedigree is suggestive at least of strabismus being due to a recessive factor. Indeed Clausen[4] has suggested that it is sometimes dominant, sometimes recessive, and sometimes due to the presence of several factors. Reber[26] mentions other families also; one, in which a father and four children showed divergent strabismus; another, in which a mother, three daughters, and the child of one of these, had a divergent squint; and a third, in which three children of a family exhibited this condition.

Reber[25] found associated with exophoria a certain type of skull shape in most instances, and concluded that the defect is partly due to the form of the orbit, it in turn being dependent upon the dolichocephalic skull which he finds so common in these individuals. He found in a family of fifty-six persons, forty of whom he measured, that thirty-four were exophoric, five were esophoric and one was normal. Of the exophorics, he took head measurements on twenty-one, and found that eighteen were dolichocephalic. It may be that both the divergent and convergent types of squint are dependent upon some underlying factor in the shape of the orbit, and that this is the primary factor inherited,—not the lack of muscle balance.

Ophthalmoplegia Externa and Interna

In an editorial in the *New York Medical Journal*[20] in 1918, the statement was made that congenital ophthalmoplegia was hereditary in 50 per cent of the cases, and that it occurred more frequently in males than in females, the

* Part I, Laws of heredity and their exemplification in the inheritance of eye colour, *Canad. M. Ass. J.*, Nov., 1926, xvi, 1340. Part II, Inheritable defects involving the eyelids and their mode of transmission, *Ibid.*, Jan., 1927, xxvii, 55. Part III, Anomalies of the entire eyeball, *Ibid.*, (Section 1), Mar., 1927, xvii, 327; (Section 2), April, 1927, xvii, 421. Part IV, Inheritable diseases affecting the conjunctiva, *Ibid.*, June, 1927, xvii, 697. Part V, Inheritable defects of the iris and lens, *Ibid.*, Aug., 1927, xvii, 937. Part VI, Inheritable defects involving the retina, *Ibid.*, (Section 1), Oct., 1927, xvii, 1191; (Section 2), Nov., 1927.

proportions being 65 to 35. Pedigrees of a mother and three children; a grandfather, father and four sons; and a great-grandmother, grandmother, father and son were given to show the hereditary tendencies in this defect. Bradburne[2] traced ophthalmoplegia externa associated with ptosis through five generations, the pedigree having been given in Fig. 2.[16] Beaumont[1] cites the history of a family in which it extended through four generations, affecting eleven members, and acting as a dominant character (Fig. 34). Cooper[7] also found it through four gen-

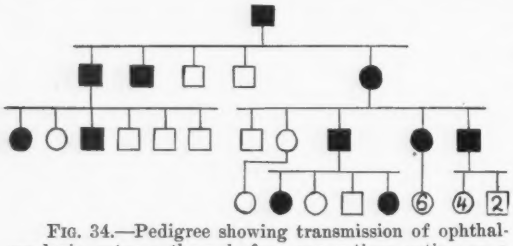

FIG. 34.—Pedigree showing transmission of ophthalmoplegia externa through four generations acting as a unit dominant character. Squares indicate males circles, females; black symbols, affected persons; clear symbols with a numeral inside mean a corresponding number of unaffected offspring. After Beaumont.

erations, affecting seven males, and always transmitted in the direct line of descent. Gourzein, Heard, and Holth, all cited by Clausen[4] saw it in two generations, affecting a man and his five sons; a man, his brother, his two sisters and his two sons; and a man and his son and two daughters, respectively. Lawford[14] and Harlan[10] each report it in two generations. All the pedigrees seem to be in agreement that the hereditary type of paralysis affecting the extrinsic muscles of the eye is a dominant character and not passed on by those who do not exhibit it.

The only pedigree of ophthalmoplegia interna that I could find in which syphilis could be excluded and heredity accepted as the explanation of the condition is one cited by Clausen,[4] in which two sisters showed pupils rigid to convergence.

NYSTAGMUS

According to Nettleship,[19] nystagmus may be divided into two types, in so far as the manifestations of the affection and its mode of inheritance are concerned. In one condition, there is no associated head movement with the oscillation of the eyes, and this condition is inherited for the most part as a sex-linked recessive defect, evident in the male and transmitted to him by his unaffected mother. The other type is found accompanied by movements of the head and is evident in both sexes and behaves as a dominant character.

Pedigrees in which the head and eye movements have been found associated have been reported by Cockayne[6] in two brothers and a sister; by Paton,[23, 24] in a brother and sister, in two different families; by Burton-Fanning,[3] in five brothers and in the three daughters of one of them; by Fisher,[9] in two first cousins and the daughter of one; by Sinclair,[28] in a mother and her three children and in two children of her sister; by Hawthorne,[11] in a man, two sons and two daughters, and in three children of one of the latter; by Yawger,[35] through four generations affecting six persons; and by Nettleship[19] through four generations acting for the most part as a dominant character, (Fig. 35). Here it will be noticed

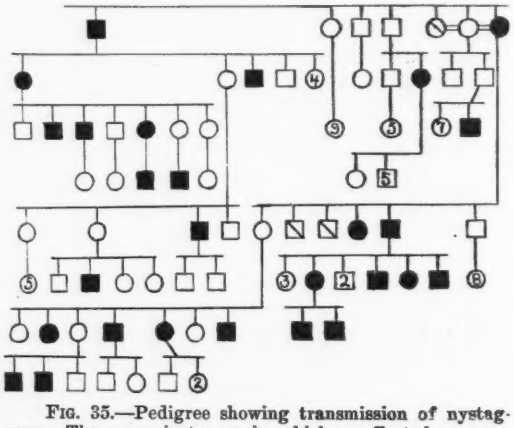

FIG. 35.—Pedigree showing transmission of nystagmus. There are instances in which unaffected persons, both male and female, have had affected offspring. The defect tended to disappear with age and also with fixation of the eyes. This may account for the apparent skipping of generations by the defect. This type of nystagmus is usually transmitted as a dominant character. The defect descended from affected parent to offspring 14 times and from so-called unaffected parent to offspring 11 times in this pedigree. \ means died in infancy; = means triplets. After Nettleship.

that sometimes the defect was passed on through an unaffected female, in some instances to affected sons, and in others to affected daughters as well. Although this might be suggestive of a sex-linked recessive character, a careful examination of the chart shows that this is not so. Nettleship states that in this family there was a tendency for the condition to regress with age,

and, in some of those affected, for it to disappear completely. Also the nystagmus exhibited a tendency to disappear when the eyes were fixed on an object, thus perhaps causing some of the affected to be listed as free from the defect by the examiner. Another family recorded by Nettleship traced its defect through four generations. Nystagmus of the type unaccompanied by head movements, and so of the sex-linked recessive variety, has been reported by Nettleship[19] through five generations, affecting ten males, the transmission being through the unaffected mother and through four generations[18] (Fig. 36). Cockayne[5] has cited the history of

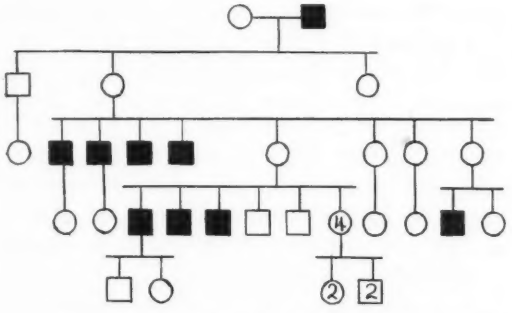

FIG. 36.—Pedigree showing the sex-linked recessive type of inheritance in nystagmus which is usually accompanied, in such cases, by other ocular defects, such as myopia, strabismus, etc. Only males are affected and the transmission is through the unaffected mother. After Nettleship.

a family in which the grandfather showed nystagmus, his six daughters and four sons were free from it, but of the five sons and five daughters of his eldest daughter, two sons inherited his defect, and of the two sons and one daughter of his youngest daughter the two boys were affected. The children of the two sons who married were clear of this condition.

What should be our advice to patients who exhibit these defects of muscle balance? They do not seem to be sufficiently serious to warrant our advocating that the afflicted persons should not reproduce, but the chances of transmitting their affections should be explained to them. In the case of paralysis of the external muscles of the eye which is so frequently accompanied by ptosis, the affected persons should not have children. In the case of nystagmus that is associated with other grave ocular defects, the affected males and their unaffected daughters and sisters ought to consider seriously whether they want to produce such defects in their offspring.

MYOPIA

Myopia appears to be inherited, and although it may be increased apparently by use of the eyes for close work, the underlying tendency to show too long an eye-ball or too great a corneal curvature is an hereditary defect. It is usually recognized that it is due to recessive factors, since it may appear in the offspring of those whose eyes are not myopic, but there are those who consider it as dependent upon one factor only, and so comparable to blue eye colour, (Jablonsky[12]), and those who believe it to be dependent upon two Mendelian factors, namely the length of the axis and the corneal curvature, (Vogt[32]). Clausen[4] calls it recessive, but does not consider it proved as to whether it is due to one or more factors. Many pedigrees of myopic families have been reported, and in agreement with the theory that it is a recessive character, we usually find that when both parents are myopic, all the children are myopic. This is explained in Table 1, Mating IV.[15] Wilson[34] records two families; one in which the father showed 2 D and the mother 9 D of myopia, and the children had 2, 4, 1.5, and 5 D myopia; and another in which the grandfather and four of his six children were myopic. One of the myopic sons married a woman with myopia, and their children showed 4, 7, 1, 5, 1.5, 3 and 6 D of myopia. The only exception was the second son who was hyperopic. Oswald's[22] pedigree shows only the males in a family affected with this error of refraction, but as there were very few females in this pedigree, it may have been mere chance that only males were affected. Theobald[29] records a very interesting history in which myopia, often associated with astigmatism and with hyperopia in the other eye, ran through four generations. Veasey[31] found seven of nine children with very high grade myopia. Fig. 37 gives an illustrative pedigree of this condition, showing it transmitted as a recessive character. Myopia of low degree is of course corrected by the appropriate lens, but there may be a myopia of such a degree of severity as to occasion the child being educated in the schools for the blind. Of the children who were sent to the Brantford (Ontario) School during the years 1921-25, there

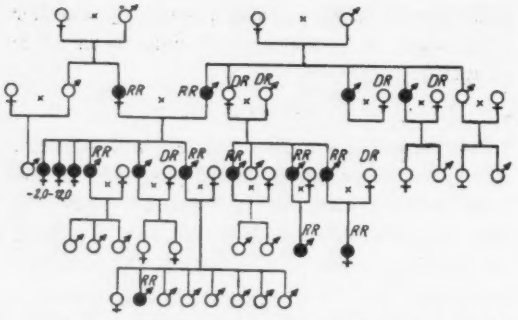

FIG. 37.—Pedigree showing inheritance of myopia as a recessive character. Circles with arrows mean males, with plus signs, females. DR means a hybrid carrying the factor for normality dominant and for myopia recessive; RR means pure recessive, carrying two factors for myopia and hence myopic. There are illustrated here all types of mating shown in Table 1.[15] Two normal parents who may be DD x DD or DD x DR have only normal children. One normal parent who is DR mates with one with myopia, RR, and has some normal and some myopic offspring. A normal parent who is DD mates with a myopic RR, but all offspring are normal. Two myopic parents RR x RR mate and have all myopic children. Two normal parents, DR x DR, mate and have some normal and some myopic offspring. Black symbols indicate those with myopia. After Clausen.

were four, or 2.8 per cent of the total, whose complaint was diagnosed as high grade myopia.

HYPEROPIA

The opposite condition seems neither to be so frequent as a cause of grossly defective vision (only one pupil being admitted to the Brantford School for this reason from 1921-25), nor to be so well defined as to its mode of inheritance. Clausen[4] considers it as due to a recessive factor. What has been suggested before in connection with other defects appears to be true here, namely that there are not only qualitative but quantitative differences in connection with the inheritance of myopia and hyperopia. For example, a myopic parent, (and thus one who has only factors for myopia) may mate with a hyperopic one, (one who has presumably only factors for hyperopia). What will the condition of the children's eyes be? According to some the result will tend to be an approximation of the algebraic sum of the two, thus approaching the normal more nearly than either of the parents. More systematic research on this subject is necessary before conclusions can be reached, and both parents and all the children will have to be examined as to their refractive errors to afford adequate data.

The three family histories showing familial hypermetropia, which I have been able to find, were taken from Clausen,[4] and are far from being complete enough to warrant deductions, except that there appears to be a quality which is inherited that results in hyperopia. He records the presence of 12, 14 and 10 D of hyperopia in three brothers; of 9, 10, 9, 10 and 11 D hyperopia in two brothers and three sisters; and 3, 16, 13 D and an unmeasured amount of hyperopia in a father and three children respectively.

ASTIGMATISM

This condition likewise is inherited in many instances, and has been found running through five generations transmitted in the direct line.[4] The axis and the degree of the astigmatism were the same in all affected members, so that there appears to be a very definite factor responsible for this defect. Such a pedigree is strongly suggestive of the dominant mode of transmission, and until further data are accumulated, we will accept that as one at least of the modes of transmission of this defect.

As to the eugenic significance of these errors of refraction it is hard to make definite statements. It would be foolish to exclude all those whose eyes are not normal in their refraction from the list of desirable parents: on the other hand it would seem unwise for those to have children whose errors of refraction have been a sufficient handicap to them to necessitate their education in special schools.

We know too little as yet about the counterbalancing effect of the opposite condition in the eyes of the mate chosen to say that, if a highly myopic person marries a highly hyperopic one, the offspring will assuredly be somewhere near normal.

OTHER HERITABLE DEFECTS OF THE EYE

Sarcoma, arising in the pigment layer of the choroid, and so of the melanotic variety, has been reported by Silcock[27] as occurring through two and probably through three generations. A man, his three daughters and the daughter of one of them, all had their eyes removed for tumour of the eyeball, and the diagnosis of melanotic sarcoma was made on the granddaughter and her mother. The probability that

all five were afflicted with the same thing is very strong. Certainly those who develop such a tumour of the eye before the marriageable age should not reproduce.

Among other affections of the choroid which seem to give evidence of being inherited may be mentioned *choroiditis* which Doyne[8] reports as having been seen by him in four of eight children, and which Best records in eight members of one family. Nettleship[18] states that the choroid may be congenitally absent, or present only in a small area at the macula. He cites the case of a family where for three generations there had occurred over the central choroid a multitude of small white dots. He found it in three children in one family. Thomson and Ballantyne[30] mention the case of two brothers in whom choroidal tissue was found in the temporal third of the optic nerve.

Coloboma of the optic nerve has been reported by Weyert[33] as occurring through three generations, affecting a man, his first daughter and two of her five children, his second daughter and her son, (her two daughters being normal) and his son. Two of his daughters and their offspring were normal.

Defective Structure of the Tear Ducts was reported by Schnyder[4] through three generations, affecting six members, and in another family, in four brothers. Nieden[21] states that nine per cent of all the defects or diseases of the tear ducts are hereditary.

Of these last mentioned defects, those which cause very imperfect vision or blindness in the persons suffering from them should be a deterrent sufficiently strong to prevent the patients from reproducing.

Conclusions

In the foregoing series of articles an attempt has been made to arouse the specialist in eye diseases, as well as the general practitioner, to a conception of the growing importance of the subject of inheritable diseases to the public at large, and to the patients themselves. Because of lack of knowledge, often of data upon which to base knowledge, a clear understanding of the inevitableness of the reappearance of these defects in the offspring has been lacking in laity and physician alike. This is not a situation, however, in which the old dictum serves, "Where ignorance is bliss, 'tis folly to be wise." Relentlessly, nature thrusts upon the ignorant the tragedy of rearing a family which reproduces the parent's defect, and more cruelly still, upon the children, the fate of sharing the defect for which they were not responsible. She allows no excuse of ignorance to interfere with her laws.

Children, in times past, were regarded as something who owed to their parents affection and support. Ought they not to be regarded in another light,—as something to which we owe a good physique, an untainted mentality and a chance to live a healthy life? Cannot our love for the unborn children be so comprehensive that those of us who cannot yield to them an unspotted heritage, will be content as Charles Lamb was, to create only dream children, who need not suffer from our defects? Surely those who have known darkness dream of the light, and when they understand, they will not wish to drag those whom they love with them into the dark.

Through the courtesy of a London physician I obtained the following record of his family. The father showed hypermetropia in one eye, and astigmatism in the other, while the mother exhibited hypermetropia and astigmatism in both eyes. Of the four children, one exhibited both conditions in both eyes, one hypermetropia in both eyes and astigmatism in one; a third, the two conditions in one eye, and the fourth, astigmatism in both eyes. Just what the mode of inheritance is would be difficult to state, but all six members showed astigmatism, and five had hypermetropia. In three of the children the amount of astigmatism and the axis of the correcting cylinder was the same.

References

1. Beaumont, W. M., *Brit. M. J.*, 1900, i, 639.
2. Bradburne, A. A., *Trans. Ophth. Soc. U. K.*, 1912, xxxii, 142.
3. Burton-Fanning, *Lancet*, 1895, ii, 1497.
4. Clausen, W., *Zentralbl. f. d. ges. Ophth. u. ihre Grenzgeb.*, 1924, xiii, 1-55.
5. Cockayne, E. A., *Proc. Roy. Soc. Med.*, Neur. Sec., 1914, vii, iv.
6. *Ibid.*, vol. vii, ii.
7. Cooper, H., *Brit. M. J.*, 1910, i, 917.
8. Doyne, R. W., *Ophth. Rev.*, 1900, p. 31.
9. Fisher, T., *Brit. M. J.*, 1902, ii, 694.
10. Harlan, G. C., *Trans. Am. Ophth. Soc.*, 1885-87, p. 42.
11. Hawthorne, C. O., *Brit. M. J.*, 1903, i, 425.
12. Jablonsky, W., *Schweiz. med. Wochenschr.*, 1923, liii, 846.
13. Landon, E. E., *Brit. M. J.*, 1909, ii, 1228.
14. Lawford, J. B., *Lancet*, 1887, ii, 1222.
15. Macklin, M. T., *Canad. M. Ass. J.*, 1926, xvi, 1340.
16. *Ibid.*, 1927. xvii, 55.
17. *Ibid.*, p. 327.
18. Nettleship, E., *Trans. Ophth. Soc. U. K.*, 1909, xxix, cxxxv.
19. *Ibid.*, 1911, xxxi, 159.
20. *New York M. J.*, 1918, cvii, 992.

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21. NIEDEN, A., *Centralbl. f. prak. Augenheilk.*, 1883, p. 301.
22. OSWALD, A. B., *Brit. M. J.*, 1911, i, 18.
23. PATON, L., *Trans. Ophth. Soc. U. K.*, 1907, xxvii, 219.
24. *Ibid., Proc. Roy. Soc. Med.*, Neur. Sec., 1914, vii, xix.
25. REBER, W., *Ophth. Rec.*, 1908, xvii, 621.
26. *Ibid.*, 1915, xxiv, 59.
27. SILCOCK, A. Q., *Brit. M. J.*, 1892, i, 1079.
28. SINCLAIR, M., *Ibid.*, 1903, i, 1204.
29. THEOBALD, S., *Johns Hopkins Hosp. Bull.*, 1891, ii, 105.
30. THOMSON, E., AND BALLANTYNE, A. J., *Trans. Ophth. Soc. U. K.*, 1903, xxiii, 276.
31. VEASEY, C. A., AND SHUMWAY, E. A., *Ophth. Rec.*, 1904, p. 15.
32. VOGT, A., *Schweiz. med. Wochenschr.*, 1923, iiii, 188.
33. WEYERT, F., *Klin. Monatsbl. f. Augenheilk.*, 1890, xxviii, 325.
34. WILSON, J. A., *Brit. M. J.*, 1914, ii, 393.
35. YAWGER, N. S., *J. Am. M. Ass.*, 1917, lxix, 773.

FURTHER OBSERVATIONS ON ASTHMA AND ECZEMA WITH SPECIAL REFERENCE TO TREATMENT*

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LAST year I reported the impressions I had received from a study of seventy-seven children showing symptoms which pointed to an allergic diathesis.

This report will deal with the progress of that group from the point of view of treatment, and with the treatment of a further group of seventy children, consisting of three breast fed and twenty-four artificially fed infants suffering from eczema, twenty-two asthmatics, four hay fever cases, two cases of combined eczema and asthma, five cases of recurrent head colds, four cases of urticaria, six cases of cyclic vomiting and two cases of epilepsy.

ETIOLOGY

The underlying cause of the allergic diathesis still remains a mystery. Heredity is a very important factor. If a careful history is taken, in practically every case there will be found parents, grandparents or relatives who have suffered from some allergic manifestation. Parents of eczematous children will often deny any hereditary influence because the disease is often considered by the laity a family disgrace. Prematurity is also a factor.

In four cases where there has been only one intense reaction to protein, the mother, also asthmatic, has given positive reactions to the same protein; in one case corn, in another case buckwheat, in another peas, and in another feathers, showing clearly the specificity of the heredity. As far as asthma is concerned, if the individual has this diathesis, and any infection in the respiratory tract takes place, it is possible for the inflamed mucous membrane to become sensitized to anything which the child breathes. The predisposing causes of infantile eczema are still obscure.

1. *Eczema in Breast Fed Infants.*—Of the three cases reported last year, one has remained an absolute cure. In this case, all sensitizing proteins have been avoided. One has developed chronic intestinal indigestion, apparently because offending foodstuffs have not been carefully avoided. The third has become asthmatic (sensitive to horse dander).

Three further cases of breast fed infants have been encountered during the year, all males. One infant, five and a half months, had eczema since one month of age, covering the entire body. Skin tests showed sensitivity to wheat, barley, potato, egg, milk, chicken, chicken feathers and orris root. When these were removed the eczema promptly cleared up from all regions except the face. The breast milk, however, soon became very scant because the mother had to avoid all foods made with milk, egg and wheat, and it became necessary to substitute artificial food. A formula consisting of cream, cornmeal, sugar, gelatine and water proved satisfactory, and the child was placed in hospital where the facial eczema was treated with tar and mask protection, and cleared up rapidly.

The second case occurred in an infant four months old, and lasted for two months. This child was sensitive to milk, wheat, rice, carrot, cabbage, beef and ginger. The same advice was

* Read before the Canadian Society for the Study of Diseases of Children at its annual meeting, Toronto, June 14, 1927.

given, and the same result followed. The breast milk promptly dried up. In two weeks, however, the eczema had entirely disappeared, and the child was gradually desensitized with a mixture of cream and oatmeal gruel, to which powdered whole milk in teaspoonful doses was gradually added. An attempt to give condensed milk was followed by a rash on the abdomen. My impression is that children sensitive to cows' milk may be desensitized more easily with powdered milk than with condensed milk.

The third case, a Hebrew infant, was sensitive to egg, wheat, tomato and lactalbumin. As in the previous case the mother's milk became scant when these substances were removed from her diet. A retest one month later showed the child no longer sensitive to lactalbumin, and he was put on a simple modified milk mixture. The itching was intense. Co-operation was not good, in that a mask was not used, and scratching was permitted. This child failed to improve as far as the face was concerned for the above reasons, although the rash on the body cleared up rapidly. This could likely have been avoided by treatment in hospital; in fact hospital treatment is absolutely essential for cases of acute infantile eczema.

During the acute itching stage I have found an ointment of butesin picrate prepared by Abbott and Company preferable to anything else. It certainly gives better results than calamine lotion or tar or kaolin ointment, or the ointment suggested by Doctor R. M. Smith at the American Pædiatric Association last year made up of milk of magnesia in a K.Y. jelly base. After the acute stage is past tar ointment gives the best results. A solution of borax in water in the proportion of one tablespoonful to a pint has served me better than oily lotions for cleansing the skin.

2. *Eczema in Artificially Fed Infants.*— Twenty-four of these cases have been studied.

It is futile to waste proteins on testing cases with small patches of dry eczema on the face of infants or young children. These cases do not give positive reactions. They clear up quickly if the skin is protected and any bland ointment is used, but the tendency to recur is very great.

An interesting case of eczema involving the entire body with the exception of the diaper area was finally found to be due to timber wolf dander. The child was allowed to play on the rug for a short time each morning after his bath. Eczema disappeared as soon as the rug was removed. The child was also sensitive to horse dander and sheep's wool, but these did not appear to be important factors.

An emaciated infant of twelve months, weighing ten pounds, with a bad family history, and a feeding history of indigestion and failure to gain on modified condensed milk, with eczema involving the face, chest and legs, was found sensitive to wheat, corn, barley, spinach, string beans, egg and all feathers. This child promptly improved when the wheat in the form of Benger's food was removed from the diet. A recurrence later took place because the mother failed to realize that hominy is made from corn. The continuous head colds immediately disappeared when feather pillows were removed.

A male infant of twelve and a half months, suffering from dry scaly eczema of the head, shoulders and buttocks with intense itching was cured in four weeks by the removal of wheat, egg, carrot, mustard, pea, potato, prune, feathers, rabbit hair and silk, and the application of K.Y. jelly. A year has now elapsed. The mother says she can produce eczema at any time by giving any of the foods mentioned above or by contact with silk.

The daughter of a dentist, ten months old, suffering from eczema of the cheeks, was given gin and white of egg to cure diarrhœa. This produced swelling of the eyes and abdomen. A few weeks later the grandmother gave the child a whole egg. This produced an intense attack of asthma. The grandmother herself had suffered from asthma for twenty years. The child was found sensitive to white of egg and ovomucoid, but not to yolk of egg. Both the eczema and asthma promptly disappeared when egg was removed, and there has been no recurrence during the last seven months.

A female child, suffering from eczema from birth, was tested in June, 1925, at the age of fifteen months, and found sensitive to egg white, egg yolk, lactalbumin and lamb. She was retested in May, 1927, at the age of three years because the eczema still persisted on face, arms and shoulders. She gave a four plus reaction to silk for which she had not been previously tested. She is still sensitive to white of egg, but not to yolk of egg. She is no longer sensitive to lactalbumin, but is still sensitive to lamb. She

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had developed no new sensitivities. A limited experience would lead one to believe that silk sensitivity lasts indefinitely.

Additional cases of a similar nature could be adduced, in which the eczematous condition was proved to depend on such substances as silk, animal hairs, feathers, vegetables of various sorts, and orris but space limits me. Improvement was obtained in all within varying periods of time, by removal of the offending substances.

3. *Asthma.*—In doing tests on asthmatic patients it is unwise to make the tests immediately after an attack, because they may at that time be in a negative phase and not react.

A boy of eleven had frequent attacks of asthma during 1925 and 1926. Skin tests were essentially negative except for chicken feathers. He moved to a new house in October, 1926, and has had no attacks since. In six months he has gained sixteen and a half pounds, special attention having been paid to his general health. In the old house the attic was full of stuffed birds, snake skins, wax flowers, etc., and it is possible that there was some protein there to which he was sensitive, and for which he was not tested.

A male child developed eczema on the cheeks at two and three-quarter months. At that time there was considerable seborrhœa of the scalp. He was very sensitive to horse dander and silk. The eczema cleared up with appropriate treatment. At ten months he developed a severe attack of asthma while visiting his grandparents in the country. The furniture in the grandparents' home was of the old fashioned horse hair variety. He continued wheezing for two weeks after coming home. At this time tests were made. He gave a tremendous reaction to horse dander, and immediately developed a very severe attack in the office requiring adrenalin as a result of the test. He was given adrenalin and stramonium more or less continuously from January to March, 1927. On March 12th desensitization was begun with 1:1,000,000 solution of horse dander. He received five increasing doses of this solution, then two doses of 1:500,000, then five doses of 1:100,000, then he had a very severe reaction. The treatment was stopped for ten days, then the dose to which he previously reacted was repeated with success. At present he is receiving 1:1,000 solution increasing doses every third day. He often has a slight wheezing attack about twelve hours before his next inoculation, which lasts twelve hours, otherwise he is perfectly well except for a slight amount of eczema on the arms. His original feeding was butter flour mixture, which was changed to cream, whey and sugar when it was found that he was sensitive to casein. He also gave reactions to egg, rabbit hair, hog hair, dog hair and chicken feathers.

The dandruff of horses is perhaps the most important single cause of asthma. Children who are sensitive to this dust will invariably develop asthma as soon as the streets become dry in the spring, and again when the leaves are falling in the autumn. A most minute quantity in the air is apparently sufficient to produce an attack. It is reasonable to suppose that dandruff is shed by horses during the winter in the snow, and that as the snow melts and evaporates this dust accumulates on the streets. Similarly in the fall when children are playing among heaps of fallen leaves they are likely to breathe in a considerable amount of dander, which has been swept up by the leaves as they sweep along the streets. The case in point shows this very well.

A boy of eight with a bad family history was supposed to have had pneumonia every spring and fall. He had had frequent attacks of otitis media. The adenoids had been removed. His attacks of so-called pneumonia were not accompanied by fever. The mother has noticed that playing in dead leaves always is followed by acute respiratory disease. The child gave positive reactions to horse dander, pigeon feathers, goose feathers, canary feathers and cat hair. It is highly probable that the attacks of so-called pneumonia were in reality asthmatic attacks.

It has been asserted that bronchial asthma is essentially protein in its etiology, whereas asthmatic bronchitis is usually bacterial. While this may be true of adults it is not always true of children as the following case will illustrate.

A female child of six years, 24 per cent underweight, had suffered from attacks of asthmatic bronchitis from birth. The chest was never free from râles, but there was no wheezing as a rule. She always perspired freely and was very constipated. She gave positive reactions to chicken, duck, goose and pigeon feathers, and to tobacco. She slept on feather pillows. There was a feather tick on the bed. The grandfather kept chickens in the back yard where she played. He smoked French tobacco. She has completely

recovered since moving from the feather and tobacco environment.

Case reports of others in my list could be cited in whom sensitivity to either food or epidermal substances could be established as the causative factor of their asthma, with the removal of which the attacks ceased. In some cases the improvement was aided by the removal of tonsils and administration of an autogenous vaccine.

Non-Specific Asthma

A female child of ten years showing clinical evidence of asthma had continuous headcolds and bronchitis from the age of thirteen months. Protein tests were absolutely negative, tuberculin skin test negative, chest x-ray negative. She was 24 per cent underweight when first seen, and presented the usual toxic symptoms. She responded favourably to a course of autogenous vaccine lasting one year, and on discharge was only 10 per cent underweight. Cases of asthmatic bronchitis which are negative to protein skin tests do not give the spectacular results seen in those who are sensitive to some non-bacterial protein.

A girl of six years had asthma spring and fall for three years. During the winter and summer she is quite well. The attacks last twenty-four hours, and are relieved by vomiting. She had been treated with liniment, nasal ointment and snuff. She gave reactions to grape, tomato, cauliflower, potato and radish. Removal of these substances, however, made little change in the condition. It was felt that she might belong to that class of case described by Dr. Kerley as "The suboxidation syndrome". At any rate she responded splendidly to the treatment he suggested for this type of case. In this case it was felt that the education of the mother was also a factor. She was taught not to have the child wear excessive clothing.

Urticaria

Four children suffering from urticaria were tested with absolutely negative results, except in one case referred by Dr. Drake, which gave a positive reaction to pork. Removal of pork from the diet was not followed by improvement in the urticaria.

Recurrent Vomiting

Children who are sensitive to certain foodstuffs may have no symptoms other than those of food intoxication. The outstanding are these:—excessive perspiration, coated tongue, constipation, poor circulation, clammy hands and feet, fatigue and malnutrition. As soon as the sensitizing foods are removed from the diet these symptoms of intoxication promptly disappear.

A female child of twenty months, previously reported last year, is the only surviving child in a family of three in which the other two had died of acidosis. She gave positive reactions to egg, peas, cauliflower, feathers, silk, horse dander and human hair. The protein to which she was most sensitive, and which apparently caused most of her trouble was egg. She was sensitive to this in a dilution of 1:100,000. Her desensitization, which began with 1:1,000,000, at present is nearly complete. During desensitization with 1:5,000 dilution she had a very severe attack of asthma which promptly ceased when she began vomiting. At this time she had been eating macaroni, which contains egg. After twenty-four hours she had the characteristic breath of acidosis and marked hyperpnœa. The usual treatment for recurrent vomiting had been unsuccessful. She was given three grains of the dry extract of valerian, and shortly after fell asleep. Three hours later she was given teaspoonful doses of a saturated solution of Epsom salts every few minutes for six doses. The vomiting promptly ceased, and within twenty-four hours she was quite normal again.

A female child of four years was first seen at the age of eighteen months on account of egg idiosyncrasy. The smallest trace of egg in her food would produce vomiting. Going into the kitchen where eggs were being prepared for food would produce swelling of the eyelids and lacrimation. She was found sensitive to egg, even in a dilution of 1:100,000, and desensitization was begun with 1:1,000,000 solution. At the end of seven months her desensitization was complete. She was then given soft boiled egg. Three hours later she had persistent sneezing and coughing. The eyelids then became badly swollen, and remained so for twenty-four hours. There was complete loss of appetite for two days. Since then she has been able to take egg in small quantities, but this appears to always cause some intestinal indigestion.

To this may be added the case of a boy of eight with a family history of hay fever and asthma, who showed cutaneous sensitivity to

casein and lactalbumin, and who had had toxic symptoms for five years. Exclusion of milk from his diet keeps him perfectly free of the vomiting and abdominal symptoms.

"Can food hypersensitivity be fatal?" The answer is emphatically "yes." A child of eighteen months was seen because of emaciation and vomiting. Five other children had died as soon as they were weaned. The mother, therefore, continued nursing them as long as possible, usually about two years, knowing she would lose them when the breast milk gave out. This child weighed fifteen and a half pounds. Fourteen skin tests showed that it was sensitive to everything tested except barley. Two days later the child died in a state of acidosis.

A male Hebrew infant of five months suffering from generalized eczema, vomiting and diarrhœa had been weaned and put on casec. This had aggravated all symptoms. He gave enormous reactions to casein, lactalbumin, wheat, recolac, dryco, klim, silk, mustard, potato and egg. On two occasions during subsequent treatment his eczema disappeared, and he became much less toxic on 20 per cent dextrimaltose. Attempts to give him any other food, however, produced more toxicity, and he died in a state of acidosis.

On two occasions infants have been seen who were suddenly weaned, developed acidosis within twenty-four hours and died. To suddenly wean an eczematous baby without knowing its sensitivity may be very dangerous.

In view of the above the following case produced no small amount of worry. A male child, son of a physician, weighed six pounds ten ounces at birth, ten pounds twelve ounces at two months, and was brought because of hunger. The family history was quite negative The mother was advised to give one to eight drachms of Schick's concentrated food after the breast. The first teaspoonful produced vomiting, swelling of the lips, and other symptoms of anaphylactic shock. The child gave strongly positive reactions to casein, lactalbumin, protein milk powder, goats' milk and lactogen. The mother was urged to give drop doses of various dilutions of cows' milk. This was done more or less regularly from the age of four months to eight months. Whenever the child received more than six or eight drops of cows' milk, however, vomiting would occur. During this four month period there was absolutely no gain in weight. At the end of that time the child refused to take anything from a spoon or bottle. The breast milg was failing. A butter flour mixture cooked five hours was fed by gavage for one week. This food apparently agreed perfectly well, and the child thrived, but still refused to take anything by mouth. Finally the nurse held the bottle steadily in the child's mouth two hours. At the end of this time it began to take the feeding, and now at the age of one year is perfectly normal and taking normal diet. It is possible that the minute drops of milk between the age of four and eight months desensitized the child sufficiently to enable it to take a big dose of cows' milk.

Practical Difficulties

Often patients are seen who are thoroughly disgruntled because they have consulted so many physicians without results. With such cases it is important to educate the parent while doing the tests. It is wise to make a list of the substances about which the mother is curious, then immediately test for half these substances, keeping the other half to the end of the tests so that her interest may not lag, otherwise she may not return after the child has been tested with the substances which she considers important.

It is impossible to do proper tests when a child is perspiring, and as the occasion of the first visit often produces excessive perspiration due to nervousness, this may interfere with proper reading of the tests as the perspiration causes the proteins to flow from one test to another. Some cases of epilepsy have been said to be allergic in origin. Complete skin tests on two such cases have given negative results.

Summary

Heredity and prematurity are important etiological factors in allergic disease in childhood. Breast fed infants suffering from eczema due to important foods such as wheat and milk cannot long be kept on the breast when these foods are removed from the mother's diet. Such cases can usually be artificially fed by carefully avoiding those substances to which they are sensitive. Where eczema is accompanied by intense itching treatment in hospital is essential.

Cases of eczema due to timber wolf, corn, silk, and orris root are reported.

Desensitization of children suffering from asthma due to egg and horse dander is a practical and satisfactory method of treatment. Horse dander is probably the most important single cause of asthma in children, but cases due to glue, canary feathers, mustard, hog hair and flaxseed are reported. Asthma of bacterial or non-protein organism is best treated by vaccine, but does not give the spectacular results seen in cases due to specific proteins. Cases of recurrent vomiting due to egg and milk are reported. Fatal cases from acidosis due to recurrent vomiting, which in turn are due to food hypersensitivity, are reported.

Conclusions

The majority of cases of infantile eczema, asthma and recurrent vomiting in children are due to hypersensitivity to foreign proteins. Desensitization with such proteins either by mouth or hypodermically is the most satisfactory method of treatment.

SOME OBSERVATIONS ON THE TREATMENT OF GOITRE*

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IN the necessarily brief time allotted, it is not the intention to enter into a prolonged discussion of the various theories and hypotheses as to the causation of goitre, since apparently, no definite conclusions have as yet been arrived at which can be wholly accepted by all.

R. McCarrison's[1] theory, which he promulgates and strongly backs, by a mass of evidence, is, that it is rather the bacteriological impurity of the water supply than its deficiency in iodine that is the causation of endemic adolescent goitre. On the other hand the work of Marine and Kimball tends to demonstrate that the administration of iodine during childhood and adolescence prevents the development of the diffuse colloid goitre of adults, and this supports the hypothesis that a deficiency of iodine in the water and food is the chief cause of endemic goitre.

If goitre is due to impure water, or a lack of iodine in the water and food, why is it that, in the case of males and females, both using the same water and food and living under apparently the same conditions, the females largely preponderate as subjects of goitre. Some statistics give the proportion as high as forty to one; in a series during the last twenty-seven years, twenty-one females to one male. There must be some other factors as yet undiscovered. There is often a history, particularly with the suddenly toxic type (marked hyperthyroidism and many cases of exophthalmic goitre), of good health, until some sudden shock, fright, mental strain, worry or anxiety supervenes, and the patient describes the onset of the symptoms as having commenced immediately after. It is in these cases, particularly with adenoma, that the injudicious use of iodine seems to stimulate or accelerate the ill effects.

In passing, one should not overlook the influence which the acute diseases of childhood, and the various infections and chronic debilitating diseases may have on the incidence of goitre, and at this point one should bear in mind the effects of menstruation, pregnancy, and the menopause in the female with goitre. Apparently, there is an intimate relationship between the secretions of the uterus, the ovaries and the thyroid.

In making a few observations on the question of treatment, I may be pardoned if the subject is viewed from the practical clinical side, and in the light of personal experience, rather than from that of the pathological, theoretical, or hypothetical; for we all know that there are many varied classifications, and various theories and suggestions offered, as to why the particular classifications outlined should be accepted. However, for practical purposes, goitre may be classified as follows:—

(a) Simple, or adolescent goitre.
(b) Colloid goitre.
(c) Adenomatous goitre (toxic or non-toxic).
(d) Exophthalmic goitre.

* Read at the annual meeting of the Alberta Medical Association, September 15, 1927.

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Many varied combinations of the above may occur, such as: colloid and adenomatous, cystic adenoma with degeneration, and so forth.

(a) It is now a well recognized fact that the simple or adolescent type of goitre may be prevented, and frequently cured, by the judicious use of iodine properly administered.

(b) Since the wonderful work of Plummer, it is also recognized that colloid goitre, *per se*, that is, when not complicated with adenoma, is amenable to treatment with Lugol's solution, dessicated thyroid, iodine, and thyroxin, etc. Plummer[2] in April of last year, referring to his treatment of colloid goitre with dessicated thyroid and Lugol's solution, states as follows: "Very large vascular thyroids may shrink one-third in volume in twenty-four hours, and the remaining very large goitre almost disappear in two weeks, although a longer period is, as a rule, necessary." He further states: "I have not seen a case in which a sufficient enlargement remained to warrant thyroidectomy." This latter statement covers a lot of ground, and should not be misconstrued, for it is a well known fact that colloid goitre, so-called, is, in many cases, impossible to differentiate from the combination of colloid and adenomatous goitre which is of common occurrence, for as Plummer[3] well says: "In most cases adenomatous goitre has its inception in colloid goitre." Simple uncomplicated colloid goitre has been difficult to find and still more difficult to differentiate. One might go further and say that in some cases valuable time has been lost, and toxic adenomata with colloid have become more toxic through the delay, and with the use of this treatment.

(c. and d.) The treatment of adenoma of the thyroid, and of exophthalmic goitre, is, in the final analysis, surgical.

The literature is voluminous on the subject of x-ray treatment for goitre, but one sees very few permanent cures with this agency. Temporary benefit in some cases may occur, but, on the other hand, one operates on a large number of cases that have been previously subjected to x-ray with varying doses over a period of weeks or months, and in more than one case in which an extensive x-ray burn had occurred as a result of its too intensive use. In cases treated with the x-ray, the operation is always more difficult, on account of numerous, dense adhesions between the capsule, gland, and overlying tissues.

Malignancy.—In a series approximating five thousand cases, operative and non-operative, malignancy has been noted but four times, only one of which was seen sufficiently early to attempt removal. The result, however, merely prolonged life, for the patient died of recurrence and metastasis in seven months, in spite of apparently complete removal followed by x-ray treatment. Early recognition, with prompt surgical removal, offers the only hope in these cases.

All cases of thyroid adenoma, toxic or non-toxic, as well as all cases of exophthalmic goitre should be brought to operation at the earliest possible moment. Those adenomata which are not apparently toxic will sooner or later become so, and often at the time first noticed may have unrecognized toxic symptoms developing. All too frequently we have seen patients being assiduously treated for "neurasthenia", "nervousness", "heart and kidney conditions", etc., etc., while a substernal or unrecognized goitre—the basic cause—is proceeding with its deadly work. Many cases have been confined to bed for weeks and months; one recent case was kept in bed for nine months and treated for, and with, nearly everything that could be suggested.

At present we cure with surgery between 65 and 95 per cent of all cases, but goitre surgery will *not* remove permanent damage to the vital organs and tissues, that has already been produced by too long delay in instigating proper treatment. Were we to see our cases early enough, we should cure 95 to 98 per cent with a mortality of less than ¼ of 1 per cent.

Preliminary Treatment

Very little is heard nowadays of the treatment by boiling water injections, but we still hear of a few preliminary ligations of one or more of the superior and inferior thyroid trunks. In my service I have never yet performed preliminary ligation, and when I so stated in a paper and clinic before the Canadian Medical Association in August, 1912, a certain amount of criticism was offered. With increased experience, with the benefit of metabolism tests and Lugol's solution, I am more firmly than ever convinced of the correctness

of this view. Patients who seemingly require this operation, and who are in a condition to stand it, can to very much better advantage tolerate the operation of removal or resection, and the operation, in the majority of instances, will not occupy any longer time, but will be of much more material benefit.

Plummer,[4] of the Mayo Clinic, in April, 1926, makes this statement: "Ligation of the thyroid arteries, with all the attendant suffering, morbidity, and expense has been almost abandoned."

Jackson[5] in his book published in July, 1926, states: "The use of iodine has obviated the necessity for ligation in fully ninety-eight per cent of the cases of exophthalmic goitre, and it is entirely probable that in time this operation will become obsolete. It is now more than a year since I have entirely discarded the use of ligation. Undoubtedly, the method of polar ligation often failed to accomplish its object, because the superior thyroid artery was not ligated."

De Quervain,[6] the eminent authority on goitre, in his work published in 1924 states: "Preliminary ligature results in the opening up of the collateral circulation, and at the second operation the surgeon finds, instead of two vessels easy to tie, a host of small collaterals, the bleeding from which is far more difficult to control than that in an untouched gland."

In connection with the use of Lugol's solution, a warning should be given, for it will be found in some cases that, when iodine or Lugol's solution has been used over too long a period, the patient again relapses, in spite of the administration of the drug. Plummer,[7] the pioneer in the use of this solution, states: "That the maximal result is, as a rule, obtained on the sixth or seventh day," and "Complete control is in many cases lost in ten days," and again he says: "After complete control of the characteristic complex and a drop in basal metabolism, the latter, with all its attendant phenomena in some instances rises to a height far above that existing previous to the administration of Lugol's solution."

Digitalis has not been found to give the benefit that was hoped for it, and was discarded some twelve years ago, this, with improved results. It is especially harmful if there is a poor myocardium with auricular fibrillation.

Operative Procedure

The mortality attending surgical intervention should not exceed 1 per cent. In my series, including all cases of whatever type, it has been less than ¾ of 1 per cent. The factors of safety, are the following:—

1. Proper preparation of the patient, for example: In toxic adenoma and exophthalmic cases, the proper use of Lugol's solution, rest in bed, metabolism tests, diet, gaining the confidence of the patient, etc., and this should be accomplished in a week or less of hospitalization. Do not drug your patient.

2. For the operation; light general anæsthesia is much to be preferred in severely toxic cases, as there is no drugging of an already very toxic patient, no devitalizing of the tissues from heavy injections of a toxic drug over which one has little or no control, no shock and extra excitability to an already overwrought patient. With a light general anæsthetic of ethyl chloride and ether, nitrous oxide and oxygen or ethylene, there is no extra strain on either the patient or the surgeon, and operations can be completed in a very few minutes.

3. Length of time of operation, with a minimum of handling of the tissues, either with forceps, sponges or the gloved hand. This is most important, and "team work" counts. The average time from the commencement of the incision until it is finally closed should not exceed twenty-five minutes, and for very toxic cases it should be less. The patient should be on the point of waking up,—coughing, speaking, or straining, before the incision is finally closed.

The days of one to three or more hours, with forty to sixty Kocher clamps, or Ochsner forceps, and twelve to twenty tubes of catgut, are now fortunately supplanted by, twelve to twenty or thirty minutes, one to one and a half dozen clamps, and two to four tubes of catgut. Minimum of handling, minimum of trauma,—maximum results.

4. Careful attention to hæmostasis. In very toxic, and severe exophthalmic cases a little loss of blood proves beneficial rather than otherwise.

5. Non-interference with the recurrent laryngeal nerves. Trauma and pressure on these nerves exert a deleterious influence on respiration which may be more serious than injury to the voice which is never more than transitory.

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The superior laryngeal nerves are only supposed to be sensory and not motor, but I have developed a wholesome respect for these nerves, as occasionally difficulty with respiration may occur when they are interfered with. This, however, may be more apparent than real.

6. Avoid injury to the parathyroids, and this is usually easy, if the posterior part of the gland with its capsule is undisturbed.

7. Especially in large multiple cystic adenomata in which the trachea is markedly displaced, prevent collapse of trachea when caused by atrophy of one or more rings from pressure. Refrain from division of the ribbon muscles in all cases where this can be avoided.

8. A small, almost horizontal, incision, not over three inches in length, and often less, in the fold of the neck, will suffice for the largest goitre, and adds to the cosmetic result.

9. Drainage tube or tubes, removed the day following operation; sutures, the third or fourth day when the patients are usually out of bed, and, out of hospital on the fifth to eighth day.

While this paper has not taken up the pathological side of the question, I would, at this time, like to acknowledge my very deep sense of gratitude to Dr. J. J. Ower, Professor of Pathology of the University of Alberta, for his splendid assistance in furnishing me with pathological studies of my specimens during the past eight years.

The surgical treatment of goitre has already reached the point where it promises to be the most interesting, fascinating, and most satisfactory work in the whole domain of surgery. When one sees the marvellous, not to say almost miraculous, recoveries from certain, chronic, invalidism; in many cases, the prevention of certain death, it becomes one's duty to urge in all these cases the intervention of proper surgical treatment at the earliest possible moment.

REFERENCES

1. *Brit. M. J.*, January 15, 1927, p. 94.
2. PLUMMER, The Beaumont Foundation Lectures, C. V. Mosby Co., St. Louis, April, 1926, p. 52-53.
3. *Ibid.*, p. 59.
4. *Ibid.*, p. 81.
5. JACKSON, Goitre and other diseases of the thyroid gland, Paul B. Hoeber, New York, July, 1926, p. 187 & 286.
6. DE QUERVAIN, Goitre, Wm. Wood & Co., New York, 1924, p. 205.
7. PLUMMER, The Beaumont Lectures, April, 1926, pp. 75 and 77.

ANÆMIA AS A PREDOMINATING SYMPTOM IN MALIGNANT DISEASE

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THE association of anæmia with cancer, particularly in its later stages, is of common occurrence. At Montefiore Hospital 65 per cent of the patients with malignant disease, admitted during the period between January, 1921, and June, 1925, presented a red blood cell count of less than four million and a hæmoglobin estimation of less than 70 per cent. This anæmia may be of all grades of severity and in individual cases may form so prominent a symptom as to dominate the clinical picture. Under such circumstances, the patient's complaints may be largely referable to the anæmia, and measures tending to its relief may in some cases result in considerable temporary improvement.

It might be found convenient to divide this class of patients, clinically, into three sub-groups, according to the relative predominance of the anæmia over the other associated symptoms. The first group may be formed by patients presenting a marked anæmia of the primary type, accompanied, occasionally, by other symptoms usually associated with primary pernicious anæmia, but with no definite evidence of malignant disease. Such are usually patients with cancer of the stomach and various writers[1, 2, 3] have commented on the occasional resemblance of the blood picture of this disease to that in pernicious anæmia. The second group is composed of patients presenting a clinical syndrome sufficiently characteristic of malignant disease to cause such a diagnosis to be suspected, but not positively established, and where, moreover, the associated anæmia overshadows the other symptoms. The third group may be formed by patients presenting clear evidence of malignant

disease, usually of the gastro-intestinal tract, whose symptoms are largely due to the accompanying anæmia.

The following case is typical of the first group.

Case 1.—(Hist. No. 12496). N. G., a peddler, aged 59, was admitted on June 25, 1924. His illness had commenced two months previously with dyspnœa on climbing stairs, followed, a few weeks later, by præcordial pains and numbness and coldness of the extremities. Examination showed a well developed and well nourished elderly man, presenting moderate weakness and ataxia on walking. The chest was emphysematous. The heart was negative. No abnormal masses could be felt in the abdomen. There was some cyanosis of the extremities. Neurological examination revealed well marked evidences of a combined sclerosis. Roentgen examination of the stomach revealed a slight indentation on the greater curvature which the roentgenologist did not regard as sufficient to indicate the presence of an organic lesion. The gastric contents showed an absence of free hydrochloric acid, and a total acidity never as high as 20. The stool was repeatedly negative to the guaiacum test. The urine was negative. The blood urea, uric acid, and sugar were within normal limits. The hæmoglobin estimation was 60 per cent; red blood cells, 2,056,000; and the colour-index, 1.5. The red cells showed a moderate poikilocytosis and anisocytosis, the general appearance being considered by the hæmatologist as suggestive of pernicious anæmia. There was considerable improvement apparent in the patient's symptoms during his stay in the hospital. He was discharged on August 19, 1924, with the diagnosis of "Pernicious Anæmia?". On April 12, 1925, he was re-admitted, this time showing evidence of marked gastric retention and, on roentgen examination, advanced carcinoma of the mid-portion of the stomach. He died two weeks later after a palliative operation.

Post Mortem Examination revealed the stomach to be infiltrated by a firm colloid-like tumour undergoing ulceration. Microscopic examination showed it to be typical adenocarcinoma, infiltrating the entire stomach wall and extending into the serosa. The kidneys, liver, and adrenals showed considerable fatty infiltration.

The diagnosis of pernicious anæmia made on the first admission would seem justifiable in the presence of achylia, dorsal sclerosis and marked anæmia of a primary type, in a well nourished man with a virtually negative roentgenogram and absence of evidences of external hæmorrhage. This diagnosis was strengthened by the apparent improvement after hospitalization.

The simulation of pernicious anæmia by malignant disease, particularly of the stomach, is a possibility that has long been recognized.[4, 5] In the association of a marked hæmolytic anæmia of the primary type with cancer some writers, however, refuse to recognize in the malignant disease the etiological factor in the causation of this anæmia. Particularly is this stand taken in those cases in which the degree of anæmia appears to be out of proportion to the size of the lesion. Minot[2] appears to be of this view and suggests that pernicious anæmia may, in some way, predispose to the development of malignant disease. Sonnenfeld[6] gives a detailed account of a case in which he believes that cancer of the stomach developed during the course of pernicious anæmia and refers to similar cases reported by Naegeli, Hirschfeld, and Zadek.

The possibility of a coincidence of malignant disease and pernicious anæmia cannot be denied. The writer is not inclined, however, to recognize in this possibility an explanation for all cases of malignant disease with a pernicious anæmia syndrome. On this basis it would be hard to explain why the great majority of such cases of malignant disease as offer any great difficulty in differential diagnosis from pernicious anæmia are cases of cancer of the stomach, a disease in which ordinarily the anæmia is quite severe. The assumption that pernicious anæmia offers a specific predilection for the occurrence of malignant changes in the stomach would seem hard to accept without more definite clinico-pathological support. It is felt, moreover, that one cannot with any degree of certainty, in any particular case, prove that cancer of the stomach became superimposed upon pernicious anæmia, since it is notorious that gastric carcinoma may be present for a long time without giving characteristic symptoms. The type of patient in the second group may be represented by the following case.

Case 2.—(Hist. No. 12743). E. H., a clothing operator, aged 40, was admitted on March 17, 1925. His illness had begun two years previously with weakness, loss of weight, dyspnœa on slight exertion, and a dull, aching pain under the right costal margin. Examination revealed a poorly nourished man, with skin of a muddy yellow tint. The heart and lungs were essentially negative. The blood pressure was 100-70. There was tenderness at the right costal margin and over the right lower quadrant of the abdomen, in which situation there was felt a tender mass extending from the crest of the ilium downwards into the pelvis. There was moderate œdema of the lower extremities. Neurological examination revealed a funicular myelitis. Roentgen examination of the chest, spine, and pelvis failed to reveal any abnormalities. There was no occult blood in the stool. The hæmoglobin was 22 per cent; red blood cells,

TABLE I.

SHOWING THE BLOOD COUNTS IN CASE 2

Date	*Hb.*	*R.B.C.*	*C.I.*	*W.B.C.*
3, 21, 25	22	1,640,000	0.69	3,900
3, 26, 25	25	1,300,000	0.96	2,900
5, 20, 25	34	1,830,000	0.95	3,000
6, 24, 25	38	2,210,000	0.88	8,800
7, 12, 25	18	960,000	0.94	11,000

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1,640,000; and white blood cells, 3,900, of which 56 per cent were polymorphonuclears, 39 per cent lymphocytes, and 5 per cent transitionals. The red cells were pale with many pessary forms. There was considerable basophilic stippling, with marked polychromasia, poikilocytosis, and anisocytosis.

Gastric analysis showed the absence of free hydrochloric acid and a total acidity of 12. The clinical course was uneventful, except for the progressive anæmia. The patient died on August 7, 1925.

On *post mortem examination* there was found, pressed against the ilium, but not invading it or the adjoining bowel, a retroperitoneal mass about six inches in diameter, which, on microscopic examination, showed the typical structure of lymphosarcoma. There was marked fatty infiltration of the viscera and an increase in the yellow pigment deposits in the spleen. The bone marrow showed marked hyperplasia. There was atrophy of the gastric mucosa. The lymph glands contained red blood cells, fibrin, and lymphocytes (hæmolymph glands).

The outstanding symptom in this case was the anæmia, which seems to have been the actual cause of death. The comparatively high colour index, the extreme anæmia with leucopenia and relative lymphocytosis, in the absence of any evidence of external hæmorrhage, suggested the diagnosis of pernicious anæmia early in the disease. The post mortem findings of marked fatty infiltration of the viscera and evidence of extra-medullary blood formation (hæmolymph glands) served to carry on further the resemblance to pernicious anæmia. It would appear that hæmolysis was, to some extent at least, a factor in the production of the anæmia. This we may assume by the lack of evidence of any other process by which anæmia could be produced, such as hæmorrhage, ulceration or obstruction, or of aplasia of the hæmatopoietic system, either as reflected in the peripheral blood picture or in the appearance of the bone marrow itself. The post mortem findings of increased pigment deposits in the viscera are in harmony with this conclusion.

Hæmolytic anæmia associated with malignant disease appears to be uncommon. Roessingh[7] was unable to find a single instance of it in his series of 70 cases of cancer. Lewin[8] denies its occurrence, on an experimental basis. Isolated cases of this phenomenon have, however, been reported. Lenaz[9] has described a case of hæmolytic anæmia associated with hypernephroma. Dietrich,[10] Polk[11] and others have found the serum of cancer patients to possess hæmolytic properties. This finding seems to have been made the basis of various diagnostic tests for cancer (Crile,[12] Elsberg, Neuhof and Geist[13]).

The close resemblance of the clinical picture in both of the above cases with that ordinarily seen in pernicious anæmia tends to suggest an etiological relationship of the anæmia in the two diseases. Whether the achlorhydria played an etiological or an adjuvant rôle in the production of the anæmia, or whether all of the above phenomena resulted from the action of a circulating toxin is difficult to state.

In what we have classed as the third type of case, the anæmia is found to play a predominant rôle in the clinical picture in the presence of definite evidence of malignant disease. The following case is representative of this class and incidentally illustrative of the effects of transfusion in patients with marked anæmia secondary to malignant disease.

Case 3.—B. S., a housewife, aged 62, was admitted on August 7, 1925. Her illness had commenced four months previously with burning pain in the epigastrium, aggravated on the ingestion of food. Examination revealed a rather obese, elderly woman, with skin of an earthy pallor, very weak, so as to be practically confined to bed. The lips were slightly cyanotic. The heart showed a to-and-fro murmur over the mitral area. The blood pressure was 108-58. There was some tenderness and resistance over the epigastrium, but no definite mass. There was some slight œdema of the legs. The gastric contents showed blood and the absence of hydrochloric acid. Roentgen examination of the stomach revealed a filling defect in the mid-portion characteristic of carcinoma. The blood sugar and urea nitrogen were 153 and 8.0 mgm. per 100 c.c. respectively. The blood Wassermann was negative. A blood count showed 2,440,000 red blood cells and 7,400 white cells, of which 65 per cent were polymorphonuclears, 32 per cent lymphocytes, and 3 per cent transitionals. The anæmia was steadily progressive. (See Table II).

TABLE II.

SHOWING THE ANÆMIA IN CASE 3 AND THE RESULT OF TRANSFUSION

Date	*Hb.*	*R.B.C.*	*C.I.*	*W.B.C.*
8, 12, 25	33	2,440,000	0.69	7,400
10, 10, 25	25	1,500,000	0.83	3,400
10, 21, 25	Transfusion of 500 c.c. of blood.			
10, 28, 25	40	2,500,000	0.80	
5, 26, 26	52	2,400,000	1.10	12,200

On October 21st. a transfusion of 500 c.c. of blood was given by the Unger method. There was almost immediate improvement in the patient's strength and sense of well-being to such an extent that she was able to leave the hospital and be followed up subsequently in the out-patient clinic. The marked anæmia persisted, but was not as severe as before the transfusion. The patient died rather suddenly on June 27, 1926, with symptoms suggestive of cerebral hæmorrhage.

Case 3 illustrates the palliative effects of transfusion in the anæmia of malignant disease. Such temporary improvement is probably due to a stimulative action on the hæmatopoietic

system and may be expected in some cases of malignant disease in which the symptoms are mainly referable to the anæmia. The possibility of hæmolysis should be kept in mind. Ewing[14] mentions this danger and believes that it is due to a toxic action on the transfused blood by hæmolysins engendered by the absorption of necrosing tumour tissue to which the patient's own blood appears to be resistant. We have found no definite evidence to support this, except in the case of one patient with cancer of the stomach who died nine days after a transfusion from no determined cause. An autopsy was not obtained. Whether or not hæmolysis was a factor in this case is problematical. In any case, it might be well to test the patient's blood for the presence of hæmolysins before transfusion. It would be logical, also, to adopt suitable physiotherapeutic and dietetic treatment as adjuvant measures for the stimulation of the hæmatopoietic system.

The cause of the very marked anæmia in certain patients with malignant disease is not clear. Various factors enter into its production. Chronic, persistent hæmorrhage, which Strümpell[4] believed to be the most important cause of the anæmia of cancer, is undoubtedly a big factor in this regard and seems to be largely responsible for the anæmia in Case 3. That hæmorrhage is not the only factor in the production of anæmia in patients with ulcerating carcinoma is demonstrated by the observation that anæmia in patients with cancer of the rectum is, as a rule, not so marked as in those with cancer of the stomach, although hæmorrhage is actually more frequent in the former disease.[15] The factor of impaired nutrition and increased absorption of necrosing tumour tissue associated with cancer of the stomach is probably the active cause of the very marked anæmia usually associated with that disease. Hæmolysis, which seems to have been the active factor in Case 2, cannot often be demonstrated in malignant disease. Aplasia of the bone marrow, except as secondary to chronic hæmorrhage,[16] has not been demonstrated to have any specific relationship to the malignant process.

Summary

It has been noticed that some patients with cancer suffer more from the accompanying anæmia than from any other symptom associated with malignant disease. This clinical group may be divided into three classes according to the relative predominance of the anæmia over the other symptoms. It has been found that such patients may sometimes receive considerable alleviation of their symptoms from measures tending to the relief of their anæmia, particularly blood transfusion. The danger of hæmolysis of the donor's blood should be kept in mind and tests for this possibility should be made beforehand.

References

1. Osler, W., The Principles and Practice of Medicine, 8th ed., D. Appleton, New York, 1919, p. 504.
2. Minot, G. R., Clinical Discussion of the Anæmias, in Oxford Medicine, Oxford University Press, New York, 1920, ii, 317.
3. Hutchinson, R., Differential Diagnosis of Organic Dyspepsias, in French's Index of Differential Diagnosis, 3rd ed., Wm. Wood, New York, 1923, p. 317.
4. Strumpell, A. V., A Text-Book of Medicine, 4th Amer. ed., 1912, D. Appleton, i, 548.
5. Oliensis, A. E., *N. Y. Med. J.*, cxiv, 298.
6. Sonnenfeld, A., *Deut. med. Woch.*, 1924, l, 1794.
7. Roessingh, M. J., *Deut. Arch. f. klin. Med.*, cxxxix, 310.
8. Lewin, C., *Ergebn. d. Inn. Med. u. Kinderheil*, 1908, ii, 168.
9. Lenaz, L., *J. Am. M. Ass.*, 1924, lxxxiii, 797.
10. Dietrich, H. A., *J. Am. M. Ass.*, 1923, lxxx, 216.
11. Polk, *J. Med. Res.*, 1904, xii, 263.
12. Crile, G. W., *J. Am. M. Ass.*, 1908, li, 158 and 2036.
13. Elsberg, C. A., Neuhof, H., and Geist, S. H., *Am. J. M. Sc.* cxxxix, 264.
14. Ewing, J., Neoplastic Diseases, W. B. Saunders, Phila., 1922, 2nd. ed., p. 68; Clinical Pathology of the Blood, 2nd ed., Lea Bros., New York, 1903, p. 421.
15. Eisen, D., *Canad. M. Ass. J.*, 1927, xvii, 307.
16. Blumenthal, R., and Morawitz, P., *Deut. Arch. f. klin. Med.*, xcii, 307.
17. Schur, H., and Loewy, H., *Zeit. f. klin. Med.*, 1900, xl, 412.

XUM

CARBON DIOXIDE: ITS PLACE IN ANÆSTHESIA

By Ralph Milton Waters, M.D.

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JUST one hundred years ago, Henry Hickman[1] sought an opportunity to demonstrate surgical anæsthesia to his fellow members of the Royal College of Surgeons. The opportunity was denied him. His confidence was based upon careful animal experiments. One of his protocols describes the following experiment:—

A puppy was exposed to a decomposition of carbonate of lime by sulphuric acid. In one minute respiration ceased. An ear was cut off with *trifling hæmorrhage* and the puppy appeared to suffer no pain. The animal lived and gained in weight.

In the last decade Morgan[2] has publicly demonstrated anæsthesia in human beings by means of 30 per cent carbon dioxide in oxygen, and Chipman[3] has demonstrated marked reduction in the blood-clotting time following anæsthesia induced with 25 per cent carbon dioxide in oxygen. These two demonstrations afford an interesting centenary to Hickman's work.

Physiologists have long taught the vital rôle played by carbon dioxide in the circulating blood as the activator of the medullary centre, which presides over the act of respiration. Practical anæsthetists for the last twenty-five years have had a vague appreciation of the possible advantages of partial re-breathing of drugs administered by inhalation. Gatch,[4] in his chapter on rebreathing in a modern textbook of anæsthesia, has set down a sane consideration of these advantages.

Some years ago Tong[5] published an admirable clinical research showing the effect of rebreathing on the systolic blood pressure. He was able to produce a rise of systolic pressure to any height he dared by the simple expedient of instituting complete rebreathing for various periods of time. This effect has been verified by all of us.

MacCurdy[6] in 1912 published a paper describing what he conceived to be the desirable drugs in an anæsthetist's equipment, in which he describes the use of a 10 per cent carbon dioxide in oxygen (he called it 10-90), which he used to raise blood pressure in cases of circulatory depression from over-etherization with drop-ether technique, where no rebreathing had been employed.

The fact that the literature of anæsthesia has been full of arguments and disagreements as to the value of rebreathing has left the practical anæsthetist to work out his own salvation in the matter. The work of McKesson,[7] in providing a means of graduated rebreathing on an anæsthetic apparatus, has offered a partial explanation of former disagreements. The demonstration by the basic sciences of the extremely delicate acid-base balance in the body and the importance to health of not disturbing this balance serves as a sound foundation for McKesson's principle of graduated rebreathing.

Fortunately, and unfortunately, the researches in carbon dioxide of the New Haven school of physiologists have entered the literature of anæsthesia in the past decade: fortunately, because these researches are brilliant and have taught us many facts of the greatest importance; unfortunately, because the facts have been made use of by practical anæsthetists in some quarters to make easy their work without sufficient investigation as to what by-effects may accompany the altered physiology which their methods induce. The desirability of maintaining the correct acid-base balance of the human body should not be lost sight of, because physiologists have demonstrated the possibility of a well person inhaling 5, 10, 20, or 30 per cent carbon dioxide without being made ill. Let us not allow the spectacular results of "stunt flying" in anæsthesia to make us forget that graduated rebreathing (the re-inhalation of expirations in amount sufficient to bring the tidal exhalation down to a pre-anæsthetic level) is based on sound principles, provided our patients were all normal as to acid-base balance. Any attempt to remove carbon dioxide from, or to add carbon dioxide to, a patient other than to maintain the elimination of carbon dioxide at the level it occupied before anæsthesia, should be based on a definite knowledge that his acid-base balance was abnormal before anæsthesia started,

or that it has been thrown off balance during the anæsthesia. The mere fact that anæsthesia can be more quickly and conveniently induced and terminated by the use of carbon dioxide is not sufficient ground for administering that gas. It makes no difference whether the carbon dioxide is added from a compression tank or has accumulated from the expiration of the patient. The important thing is: Can the acid-base balance be more carefully guarded in a given case by the addition of carbon dioxide or by its complete or partial removal from the respiration medium? The answer in the normal case undoubtedly was given by graduated rebreathing, the patient being made to rebreathe such an amount of each exhalation as to make his actual tidal exhalation per minute equal to that which he maintained before anæsthesia. In the case of the sick patient, acid-base balance may already be distorted, in which case if we wish to be conservative, *definite knowledge must be at hand* at least *as to the direction of the deflection from normal,* if not the amount of that deflection. *The use of carbon dioxide in greater amounts than graduated rebreathing affords,* without this knowledge, *must be backed up by proof that the acid-base balance is not affected and that there are no other ill effects.* The purpose of a discussion of carbon dioxide in its relation to inhalation anæsthesia is to call your attention to certain possible dangers in the use of the drug in certain cases.

In a review of the literature coming from clinical sources reporting on the use of carbon dioxide in anæsthesia, one finds the greatest enthusiasm expressed for its usefulness. However, in almost every report which I have read, mention was made of at least one or two cases of untoward results: "Collapse", "Patient became pale or livid," "Convulsions," etc., are some of the expressions used.[8, 9] The writer cautions against the use of carbon dioxide in etherization in the aged and in children. I have found no mention of ill results from the use of high percentages (25 and 30 per cent) of carbon dioxide for the induction of anæsthesia and as a preliminary to rapid etherization, but, as such practice has been extensively used by technicians, who are not apt to report their experiences, I have no doubt such untoward results may have occurred. I make this statement because my own experience with the method for experimental purposes makes me believe it possible. In addition to the use of carbon dioxide to control respiration during inhalation anæsthesia, the literature refers to its recommendation by Stadie and others for the control of respiration in drug overdosage with morphine, and in carbon monoxide and alcohol poisoning, both for the purpose of rapid elimination and to overcome the depression of the respiratory centre. There is another use of the drug advocated by Chipman,[3] namely, for the purpose of decreasing the coagulation time of the blood. The method is as follows: 25 per cent carbon dioxide with 75 per cent oxygen is inhaled by the patient to the induction of anæsthesia, and ether is rapidly added for the maintenance of anæsthesia for tonsillectomy. The clotting time is reported to be reduced by one-half in most cases. Sheldon[10] reports cure of hiccough with 25 per cent carbon dioxide in oxygen; Riglietti[8] reports the prevention of post-operative lung complications; Churchhill[11] reports a re-expanding lung in atelectasis and massive collapse of lung. In the discussion of Chipman's paper, the statement was made by Lundy that carbon dioxide is the potent factor in cases of corn silo poisoning and that autopsy of such cases has shown solid blood clots in the blood vessels.

Before further extensive use of carbon dioxide in anæsthesia in other than the conservative manner previously advocated for many years in the form of rebreathing, or for definite indications, such as respiratory depression and depleted blood pressure, *when due to previous ill-advised excessively deep breathing* allowed to continue *without rebreathing,* would it not be well to investigate all the possible physiological effects accompanying the administration of carbon dioxide? A review of the literature indicates that[12] as the percentage of carbon dioxide inhaled increased, circulation and respiration are first stimulated and then at certain points suddenly depressed. The point of beginning depression is said to be not the same for circulation as for respiration, that for circulation probably beginning first. How the acid-base balance is affected at various percentages is not clear. If the clotting time is reduced, how far the process may be carried safely is not determined. The possibility of raising systolic pressure to dangerously high levels has

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not been considered. Is it not worth while waiting until we have the answer to these questions before we subject patients to extreme changes in their carbon dioxide intake? At Wisconsin we have made a small beginning in a search for more definite knowledge of these problems.

We have, for several years, used a technique in which a filter for carbon dioxide is interposed between the mask and a rebreathing bag, allowing complete rebreathing of anæsthetic mixtures with the addition only of enough oxygen to supply metabolic needs. When using this technique, rebreathing of some 200 c.c. of each inspiration takes place, this much being contained in the mask and filter between the soda lime and the face. We have long noticed that this technique gave us quite an ideal respiratory rate and volume in the average case. The occasional case, however, does better with a change to some other technique, sometimes to one which gives more rebreathing (carbon dioxide accumulation) and sometimes to one that gives less. We have also noted that when the alkali in a filter begins to become saturated with carbon dioxide, two things are observed clinically: first, a hyperpnœa develops and, secondly, the systolic blood pressure rises, both to return to normal on the establishment of free expiration and breathing fresh gases, or by the substitution of a fresh unsaturated filter. The effect of a saturated filter is, of course, exactly similar to the effect of rebreathing shown by the work of Tong, Gatch, and others above referred to, and for the same reason; namely, because of an accumulation of the patient's expired carbon dioxide in the respiratory medium. Whether, coincident with this systolic rise, a reduction in clotting time always takes place—we are not yet positive, but we have reason to believe that a reduction in clotting time does take place, at least in some cases of extreme rebreathing without filtration.

Since the claim has been made that the effects of rebreathing are not duplicated when a mixture of carbon dioxide and oxygen was inhaled from a tank, we subjected several normal individuals to inhalation of various percentages of carbon dioxide in oxygen. The resulting effects on systolic pressure and clotting time are shown in the accompanying tables (Tables I, II and III). It will be noted that there is always a rise in systolic pressure when carbon dioxide is added to the inspired oxygen and that the clotting time is always decreased. As our volunteer subjects were not inclined to subject themselves to more than a minute or so in high carbon dioxide atmospheres, we cannot now say how far it is possible to carry this systolic rise and clotting time reduction. A further investigation of the problem in the laboratory is indicated.

TABLE I.

	Blood Pressure			
	Sys.	*Dias.*	*Pulse*	*Coag. Time*
Before taking CO_2	110	75	68	2 min. 30 sec.
After taking 15% CO_2 for 1 min. 30 sec.	135	75	100	2 min. 15 sec.
				Decrease
Increase of..	25 or 22.72%	0	32 or 47.06%	15 sec. 10%

Showing effect of inhaling 15 per cent carbon dioxide for 1 minute and 30 seconds.

TABLE II.

	Blood Pressure			
	Sys.	*Dias.*	*Pulse*	*Coag. Time*
Before taking CO_2	110	70	92	2 min. 30 sec.
After taking 25% CO_2 for 1 minute ...	140	85	116	1 min. 45 sec.
				Decrease
Increase of..	30 or 27.27%	15 or 21.43%	24 or 26.08%	45 sec. 30%

Showing effect of inhaling 25 per cent carbon dioxide for 1 minute.

TABLE III.

	Blood Pressure			
	Sys.	*Dias.*	*Pulse*	*Coag. Time*
Before taking CO_2	124	80	80	3 min. 10 sec.
After taking 30% CO_2 for 30 sec.	170	90	104	2 min. 35 sec.
				Decrease
Increase of..	45 or 37.09%	10 or 12.5%	24 or 30%	35 sec. 18.42%

Showing effect of inhaling 30 per cent carbon dioxide for 30 seconds.

Since carbon dioxide was inhaled in a mixture containing at least 70 per cent oxygen in the experiments just mentioned, and since an extreme hyperpnœa necessarily accompanies the inhalation of high concentrations of carbon dioxide, the experiment was repeated with an individual who attempted to imitate the extreme hyperpnœa he had seen developed by carbon dioxide inhalation, but using pure oxygen as a respiratory medium. The result

is shown in Table IV. It is quite clear that neither the muscular effort nor the super-oxygenation accompanying the carbon dioxide

TABLE IV.

	Sys. Blood	*Dias. Pressure*	*Pulse*	*Coag. Time*
Before taking pure O_2	120	75	68	2 min. 30 sec.
After taking O_2 for 6½ min.	110	75	68	2 min. 25 sec.
Decrease of..	10 or 8.33%	0	0	Increase 5 sec. or 3.33%

Showing effect of inhaling pure oxygen with voluntarily forced hyperpnœa for 6½ minutes.

inhalation is a very great factor in causing the results shown in Tables I, II and III.

In Chart I is shown a reproduction of the

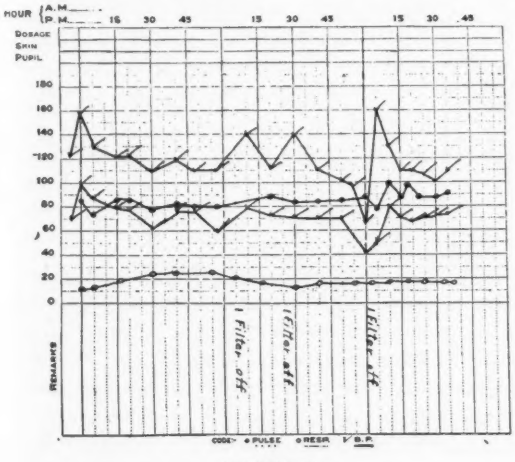


CHART I

CHART I.—Anæsthetist's chart showing alternate effects of complete removal of carbon dioxide and complete rebreathing. Last 15 minutes shows attempt to adjust removal of carbon dioxide to maintain systolic pressure at normal.

anæsthetist's chart during an anæsthesia conducted with an apparatus constructed on the same principle as the metabolism estimator commonly used in your hospital. A continuous circuit of the respiratory medium is maintained by means of one-way valves. Each complete expiration is pushed toward a carbon dioxide filter and each inspiration is drawn from the filter. The anæsthetic mixture contained in this closed system can be all or partially passed through the filter or the filter may be cut out of the circuit entirely. During this particular anæsthesia, the filter was completely in use except for the three short periods marked by the straight lines in "remarks" and except for the period following the last mark until the close, when the valve was being adjusted to *partially* filter the respired medium.

Here again is shown the effect of carbon dioxide on systolic pressure. Whether the extreme drop in systolic pressure is the effect solely of too little carbon dioxide in the patient, I will leave you to judge until we can make further investigations.

Conclusions

After six months' consideration of the possible uses of carbon dioxide in anæsthesia, I am convinced that:

1. Changing the amount of carbon dioxide inspired by sick patients is interfering with fundamental physiology and should not be undertaken lightly.

2. The use of carbon dioxide by the anæsthetist probably can be put on a rational basis.

3. Until more knowledge is available, conservatism in the use of carbon dioxide by the anæsthetist should be practiced.

References

1. Gwathmey's Anesthesia, Edition, 1914, p. 8.
2. Morgan, Ben., Public demonstrations at Philadelphia, Kansas City and other places.
3. Chipman, Cline, *Current Researches*, August, 1926, v, No. 4.
4. Gatch, N. D., Gwathmey's Anesthesia, Chapter 3, p. 100.
5. Tong, G. W., *Am. J. Surg.*, Supplement, July, 1922, xxxvi, 79.
6. McCurdey, John R., *Modern Hospital*, 1912.
7. McKesson, E., *Am. J. Surg.*, 1915, xxix, 51-57.
8. Riglietti, Ethel, *Current Researches*, Feb., 1926, v, 8.
9. McKenzie, J. Ross, *Brit. J. Anæs.*, Oct., 1926, iv, 92.
10. Sheldon, Russel F., *Current Researches*, Feb., 1927, vi, 31.
11. Churchill, E. D., *Boston M., & S. J.*, April 8, 1926.
12. Gwathmey's Anesthesia, 1914, p. 111. (2 notes, Hill and Cleck).

SOME ASPECTS OF THE PROBLEM OF JOINT TUBERCULOSIS*

By Russell A. Hibbs, M.D.

New York

THE New York Orthopædic Dispensary and Hospital has devoted special attention to the long time treatment and study of individual cases of joint tuberculosis. Its Country Branch was established twenty-two years ago, and provided a hospital in the country where the individual patient could remain for long periods of time with no interruption in treatment and obtain the advantages of good food, good air, and sunshine in his treatment. After discharge from the Country Branch the follow-up was continued indefinitely through the City Dispensary, so that the observation of such cases was uninterrupted for a long period of years. This would seem to be the only way to obtain trustworthy facts in regard to a disease, of which the course is so long and the tendency to recur after years of apparent quiescence so great. An end-result study has been made of seventy-seven cases of knee-joint tuberculosis which were treated at the Country Branch and have been under observation for from five to fifteen years.

In 13 per cent of these cases an incorrect diagnosis was made. Of the sixty-seven patients remaining, seven died from other forms of tuberculosis. Forty-three of the knees became quiescent; sixteen again became active, leaving only twenty-seven inactive cases. This term is used advisedly, rather than cured, because, as has been found time and time again, patients with tuberculosis who were thought to have been cured for many years have had recurrences of the old condition. Of the twenty-seven, five have stiff joints; twenty-two have varying degrees of motion, but all with marked limitation and seriously crippled joints, so that the final result of the conservative treatment in thirty-three cases was active disease. Sixteen of them subsequently had a fusion of the knee by operation and have remained free from symptoms. Indeed among the large number who have had this operation and are not included here, not a single case of recurrence has been seen.

The average length of conservative treatment in these seventy-seven cases was six and one-half years, and the average period of observation fifteen years.

The results in the conservative treatment of tuberculosis of the hip at the Country Branch are still worse. From 1904 to 1921, two hundred and eight such cases were treated. Errors in diagnosis were made in forty-six cases (22 per cent), leaving one hundred and sixty-two who probably had tuberculosis. Of this number one hundred and fifty were observed for from three to fifteen years. Thirty-six of this number, or 24 per cent, died. In twenty, death was due to tuberculosis, six from other causes and in six cases the cause of death is unknown. Of the one hundred and fourteen remaining, seventeen are still active; two are quiescent with probably free motion; forty-one are quiescent with very marked limitation of motion, sometimes with only a few degrees, but with varying degrees of deformity. Fifteen patients had relapses after periods of quiescence varying from one to nine years. The average duration of treatment in these one hundred and fourteen cases was seven and three-tenths years. Nine patients had operations for hip fusion after periods of disease varying from seven to twenty-five years. Altogether, more than eighty such operations have been performed, and the result in those in which a sufficient time has elapsed to make any judgment possible is a high percentage of cures. More or less the same situation exists in regard to tuberculosis of the spine as well as the ankle. Of course tuberculosis of the joints of the upper extremities has a somewhat better outlook, as these joints are not subjected to the traumatism of weight bearing. It is by no means sure, however, that in these joints an absolute cure is ever obtained with mobility. Certainly no such hope may be justified in the weight-bearing joints and in the spine. It would seem in-

* Read at the annual meeting of the Canadian Medical Association, Toronto, June, 1927.

evitable that this study offers convincing evidence that our conception of the cure of joint tuberculosis must be revised and our methods of diagnosis perfected.

We cannot any longer trust the methods of diagnosis that have been in universal use in the face of such a large percentage of errors, nor is it possible to be guided in the use of methods of treatment based on the study of cases in which such errors in diagnosis are possible. Most of the studies made upon the end-result in the treatment of the disease are unreliable, not only because of errors in diagnosis, but also because of the failure to observe individual cases over a long period of time, the only way in which the recurrences, which are so frequent, may be recorded. Relapses occur ten, fifteen and twenty years after all treatment has been discontinued and the cases have been classified as cured.

The difficulties of diagnosis in joint tuberculosis, especially early in the disease, are so great and the frequency of error so common, that the exponent of any method of treatment must first prove the pathology by laboratory test, and the results by the observation of the individual case over a long period of time, before the method can be accepted as a cure. A laboratory test of the condition is not always possible in vertebral tuberculosis, but in these the clinical findings and x-ray pictures, especially in children, are almost conclusive.

The terms "quiescent" and "cured" have been inaccurately used. There can be no doubt that many cases have been classified as quiescent which were not so, and many classified as cured which were not cured. So many so-called quiescent cases have been found at operation to have very active disease, although living comparatively active lives, that thus far we have no trustworthy evidence of inactivity in this disease. Certainly the condition of the general health is no guide. We have observed case after case of hip-joint tuberculosis in children at the Country Branch whose general appearance from every point of view was that of robust health, but who showed unmistakably the steady progress of the disease in its destructive effect upon the hip joint. This has occurred in spite of the fact that they had the advantage of exposure to the sun's rays for about eight months of each year, which brings up the question of the influence of heliotherapy on joint tuberculosis. There is no evidence yet to prove that heliotherapy has any particular influence upon the progress of the disease, and there is grave danger that the belief that it does so, which is so generally accepted, may delay the proper study of this disease for another decade.

On Tornadoes.—The cause of the tornado is essentially the same as that of a severe hail or thunder storm. From the west or northwest comes cold air which overrides warm, moisture-laden air from the south or southwest. The surface of contact of the two winds is a slanting one so that about a hundred miles east of the trough, as the line of contact at the ground surface is called, the two winds clash at a height of about a mile. It is at about this point that the so-called funnel-shaped cloud usually forms, whirling like a top and carrying within it reduced pressure which causes houses in its path to literally blow up because of the released pressure within them. The warm air beneath, charged with moisture and immense energy, sets up a most violent convection and vertical overturning of the atmosphere which results in the typical tornado vortex, an immense eddy in the ocean of air.

Due to the limited area affected by the tornado and the impossibility of predicting just where it will occur, the Weather Bureau does not attempt to issue forecasts of these storms other than to warn of "severe local storms." If tornadoes were definitely predicted hundreds of thousands of people might be unnecessarily worried and the loss due to this condition might greatly exceed the damage that might be prevented.

About a hundred tornadoes occur each year in the United States and they take a toll of about 300 lives yearly on the average. The tornado season for most of the country is from March to October. Little can be done to protect against the tornado, but meteorologists give this advice: If you see the tornado cloud advancing toward you, run northward or toward the northwest, in the direction of your left hand as you face the storm. If there is a "cyclone" cellar or tornado cave, get into it as soon as possible. In a frame house the best thing to do is to go to the southwest corner of the basement. In a brick or masonary structure, do not go to the cellar as that is the most dangerous place. — *Science Supplement*, Vol. LX, No. 1710.

New Instruments and Technique

A NEW "LOOP TRACTOR" FOR USE IN GASTRO-INTESTINAL ANASTOMOSIS

By Warren H. Lang, M.D., F.A.C.S.

Vancouver

MANY experienced surgeons to-day agree that there is a real element of danger to the patient in applying any form of clamp, even if protected by rubber, to an already partially devitalized intestine for the purpose of doing an anastomosis. The clamp is often applied for a period of from one to two hours or less, depending upon the dexterity of the surgeon. The degree of compression exerted will necessarily vary with the judgment of the operator.

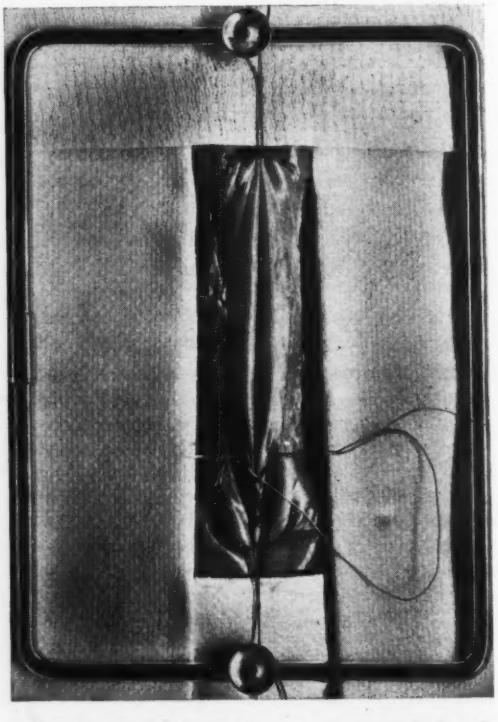
Deaths from perforation or hæmorrhage, due to necrosis occurring on the line of the constricting clamp, have been recorded in several instances, in the hands of thoroughly experienced surgeons. The cause of death was discovered at autopsy. Clamps as usually applied impede the operation, obscure the bleeding points, and make accurate closure at the angles of the anastomosis especially difficult. One prominent surgeon told the writer he had abandoned the use of the clamps entirely on account of the above mentioned complications.

It has been the custom where clamps are not used in doing such operations to suspend the loops at either end by a suture grasped in forceps and held by an assistant, whose hands at best are unsteady and in the way of the surgeon. The tension is variable and uncertain and the suture line as a result is often imperfect. The device described here overcomes all the defects above mentioned and releases the assistant for more important duties.

The instrument which the writer has devised will in his opinion perform very well the work of the clamp and is devoid of these dangers. In addition, where clamps are not used, bleeding points can be seen and ligatured before the anastomosis is completed thus reducing the danger of post-operative hæmorrhage.

Before opening the intestine it is advisable to strip its contents downwards. The stomach, if it is safe to do so, should be emptied before operation.

The illustration attached shows the instrument in use, to which the name "Loop Tractor" has been given. The object of it is to suspend the intestinal loops in a taut position for suturing. It consists of a metal frame, 5″ by 7″, rectangular in shape, having a holding button situated at the middle of either end. The button is seated closely on the frame so that a suture passed around it at once grips without tying. A fine linen holding-suture is the one of choice for this purpose.



The frame is placed so as to surround the abdominal incision and rests on the sterile towels, the loops of intestine are brought up through the frame, and the desired length of each loop is picked up with tissue forceps. The loops are then brought parallel to each other and a linen suspensory suture passed through a small bite

of peritoneal and muscular coats only at either end of the anastomosis. The ends of these sutures are grasped and drawn firmly in opposite directions and wound around the button on each end of the frame, as shown in illustration. This will hold the loops firmly on the stretch while stitching is being done.

After thoroughly testing out these two methods, the writer has come to the conclusion that his method renders these operations less difficult, secures a greater degree of safety to the patient, and that his "Loop Tractor" does the work of an assistant, and does it more efficiently.

Case Reports

AN OPEN BEAUTY PIN IN THE ŒSOPHAGUS OF A SIX WEEKS' OLD INFANT*

By David H. Ballon, M.D.
Montreal

T. K. A female infant aged 6 weeks, referred by Dr. Lyman G. Barton of Plattsburg, N.Y., May 1, 1927.

History.—While the mother was attempting to fasten the infant's jacket with a beauty pin, the latter slipped out of her hand and dropped into the mouth of the crying infant. The patient was immediately taken to the Champlain Valley Hospital, Plattsburg, where Dr. Barton took a roentgenogram, which showed an open pin lying behind the heart and aorta, about the level of the 4th, 5th, and 6th vertebræ. (Fig.1.) The

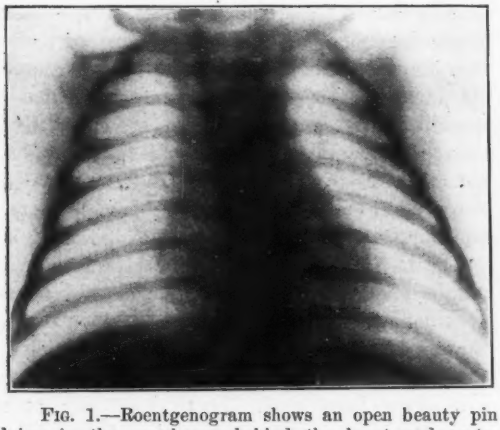


Fig. 1.—Roentgenogram shows an open beauty pin lying in the œsophagus behind the heart and aorta, opposite the 4th, 5th, and 6th dorsal vertebræ.

infant was brought to the Royal Victoria Hospital seven hours after the accident.

I did a direct œsophagoscopy, without any anæsthesia, using Jackson's infants' œsophagoscope; I found the pin lodged in the œsophageal wall and extracted it with Patterson's forceps without any difficulty.

The whole examination lasted five minutes. The child nursed immediately and was taken home. There was no reaction.

* From the Bronchoscopic Clinic of the Royal Victoria Hospital, Montreal.

DENUDED SURFACES TREATED BY TANNIC ACID

By A. B. Walter, M.D., C.M.
Cambridge, N.B.

From the use of aqueous tannic acid solution on burns to its use on surfaces denuded by other traumata would seem a logical step. The writer has recently employed it in two cases of minor injuries inflicted by industrial machinery of the average grade of cleanliness; both cases being impossible of repair by suture.

Case 1.—March 26, 1927. C. S., a boy on farm, while pushing vegetables through a cutting machine, was caught by the rotary knife and had slices cut off distal phalanges of three fingers, including the major part of each nail and matrix. No flaps remained. The largest denuded area measured 3 x 1.5 cm. The wounds were seen three hours after they had been received. They had, in the meantime, been dressed with vaseline; they had bled freely and were macroscopically clean. The surroundings of the wounds were cleaned with ether.

Treatment.—Devitalized tags were removed and the raw surfaces were dressed with compound tincture of benzoin and dry dressing. The removal of this dressing forty-eight hours later was so painful that it was decided to try tannic acid as a dressing. A 5 per cent aqueous solution was sprayed on the wounds hourly for twenty hours. No covering dressing was allowed. Firm non-sensitive scabs formed as over burns, and

the patient claimed perfect freedom from pain in fingers.

Four days after applying spray, a drop of pus was found under each of two scabs. Daily relief of this by cracking the scab restored dryness in one wound after two days, in the other only after nine days, as the crust fell off. After six days the crust was completely away from the smallest wound; after twelve days, from the largest; and were replaced by a thin dry glaze of inspissated serum. At this time the patient, who had suffered no pain from the time of the application of the tannic acid, insisted on using his fingers freely in work—fourteen days from time of injury—and continued to do so. He did not report for some time afterwards, and then claimed that epitheliation had been completed by April 17th, three weeks after his injury was received. The scars were thin and unusually free from tenderness.

Case 2.—September 21, 1927. H. H., a millhand, was cut by a trimmer rotary saw. The wound was dressed with simple ointment. He was seen by me two hours after accident. He showed multiple lacerations of tips of three fingers, with loss of most the nails and pulp.

Treatment.—After cleaning and trimming, tannic acid solution was applied as in case 1, with no other covering. The patient was seen three times afterward, but since the areas kept perfectly dry, nothing further was done. The crusts completely separated by the nineteenth day after the injury, and by the end of four weeks the patient was doing full days' work at the saw, work necessitating the use of the hand in lifting heavy deals. Epitheliation was complete several days before returning to work.

The writer feels that in the attaining of simplicity, comfort, freedom from painful dressings, speedy healing and lightness of scar, this dressing is a superior one; and since he has not seen in current journals any reference to its use, makes this his apology for reporting his first opportunities of using it.

A CASE OF IDIOPATHIC DILATATION OF THE ŒSOPHAGUS OR CARDIOSPASM

By F. A. C. Scrimger, M.D., C.M.

In order to be of interest, the study of a case such as that here reported must bring evidence in support of or opposed to the explanations which are current in regard to the cause of the disease; or it must add one more instance to the success or failure of some form of treatment.

It may therefore be permitted to mention the etiological factors which have been put forward to explain a diseased state of the lower end of the œsophagus, variously called cardiospasm, achalasia of the œsophagus, or idiopathic dilatation of the œsophagus.

The clinical picture presented is fairly constant. The incidence of the disease is sufficiently great to make it of some importance. The case to be reported is typical in its signs and symptoms. The various titles under which the disease is discussed illustrate that the opinions held in regard to its causation are not in agreement one with another.

The term cardiospasm clearly indicates the opinion that there is an overaction or muscular spasm of the cardiac end of the stomach or the lower end of the œsophagus. Achalasia of the œsophagus suggests the opinion that the pathological state is due to a failure of the dilating mechanism. Idiopathic dilatation is more cautious and commits the user to little, yet even here is hidden the suggestion of a congenital fault. Other theories call to their aid narrowing of the crura of the diaphragm at the point where the œsophagus passes through; or pressure by the left lobe of the liver.

Recently an interesting suggestion has been made in Guy's Hospital reports. G. W. Rake reports finding in three post-mortem specimens a degeneration of Auerbach's plexus, consisting in a fibrosis of the ganglion and disintegration of the ganglion cells. In an early case previously described the lesion had been shown to be a subacute inflammation of the plexus which had not gone on to degeneration and replacement fibrosis. It seems probable that this view is a real addition to the knowledge on the subject.

The history of the patient here reported will not be given in full detail. The distress began at a definite period five years ago, when during the act of swallowing a sudden pain was felt at the lower end of the sternum. Since then she has never been well. There has been great difficulty in swallowing any kind of food, solid or liquid. She took a great deal of time, often two to three hours, to ingest an ordinary meal. She has learned to take large quantities of warm water with every mouthful. Often in spite of these precautions she regurgitated the food taken hours before. The difficulty in getting sufficient nourishment had gradually increased

and she had lost weight. Her weight on admission was eighty-nine pounds. During the last three years she had been in and out of hospitals during periods of exacerbation, Various diets had been tried. Dilatation of the œsophagus had been carried out. Bougies passed readily, but dilatation had no effect, not even temporary relief being afforded by this means. The x-ray examination was typical. The barium mixture showed that the œsophagus was greatly dilated, and that it narrowed abruptly at the level of the diaphragm. A little fluid passed from time to time into the stomach.

Previous to her admission to the surgical wards the patient had been under the care of Dr. R. H. M. Hardisty, who had established the diagnosis and had tried various forms of treatment before suggesting surgical interference.

On November 15th, 1926, the patient was operated upon under gas-ether anæsthesia with the diagnosis of idiopathic dilatation of the œsophagus. The operation performed was an extramucosal incision of the muscles of the œsophagus and cardiac end of stomach.

Operation Report

The incision was made along one inch from the left, at the margin, from the tip of the ensiform to the 10th rib. The rectus muscle was incised in the length of its fibres over the 7th cartilage, and the 7th cartilage was cut close to the sternum. The margin of the cartilage was then freed by turning the rectus muscle to the outer side, and the costal cartilages of the 7th, 8th and 9th ribs were cut through near the junction of the bone. The whole flap, thus loosened, was held aside by retractors. On opening the peritoneum, the upper surface of the liver was well exposed, and the left lobe of the liver was then pressed downwards and the coronary ligament incised, until the left lobe could be easily pressed out of the way, downwards and to the right. The cardiac end of the stomach was thus exposed. The peritoneum over the lower end of the œsophagus was incised, and the œsophagus freed until the dilated portion came into view. The dilated portion that was seen was fully an inch and a half in diameter, and below this it narrowed to about half an inch in diameter, and felt like a muscular cord. The serosa and muscularis of the stomach were incised, and the muscular coat over the normal portion of the œsophagus was gradually lifted from the submucosa, and torn open, exposing the submucosa of the lower inch and a half of the œsophagus, and the proximal inch of the stomach. The stomach tube was passed down, entering freely, covered only by mucosa and submucosa. There was no remarkable hypertrophy of the circular muscles of the normal portion of the œsophagus. Bleeding stopped, and the wound was closed.

Patient had an uneventful recovery. She took fluid after the first twelve hours; within four days she was taking a general soft diet and was discharged December 1st, eating all ordinary food. On that date, just before her discharge, a fluoroscopic examination demonstrated the method by which food was now swallowed.

The dilated œsophagus was as before: but as soon as a column of fluid about three inches long collected above the diaphragm the narrowed cardiac end opened and allowed the fluid to pass; that is, a head of pressure of about three inches was necessary for the lower narrow portion of the œsophagus to open. After the meal had ceased it was fully ten minutes before the barium had completely left the œsophagus.

The patient was last seen on October 29th, 1927. She had gained in weight, which was now 128 pounds; she was feeling well; she was taking all ordinary food with the others of her family.

At operation it was seen that there was no hypertrophy of the muscular wall of the œsophagus over the narrowed area where the obstruction occurred. The œsophagus was distinctly smaller than normal; its diameter being not more than half an inch. Above the diaphragm the œsophagus was both dilated and hypertrophied. It would seem that the obstruction was in this patient due to a failure to dilate an achalasia and possibly in the light of Rake's reports this was associated with a degeneration of the ganglia in Auerbach's plexus.

From the operative point of view the ease of approach obtained by the use of the generally adopted Marwedels incision was worthy to be noted. The under surface of the diaphragm, the subdiaphragmatic parts of the œsophagus, and the cardiac end of the stomach were all easily reached.

XUM

PYELITIS IN A PTOTIC KIDNEY, ASSOCIATED WITH A FOCAL INFECTION

By J. W. Auld, M.D.

Calgary

Pyelitis is more frequent in the female than in the male, and during infancy and early childhood it is almost twice as frequent as in the adult.

A common mode of infection is by an initial inflammation of the renal tissue due to bacteria drained from the blood stream at a time when obstruction is present in the urinary tract, resulting in congestion and stasis. The most important feature, not only in the production, but also in the perpetuation of renal pelvic infection, is some obstruction in the urinary tract. This condition is met with in fully 80 per cent of all cases of pyelitis. The mere presence of bacteria in the blood does not occasion an infection of the kidneys. The healthy kidney may excrete bacteria for a long time without developing infection, but when from any cause obstruction to the outflow of urine occurs in the lower urinary tract stasis is developed, pressure atrophy may occur, and pyelitis sooner or later will develop, more especially if at the same time a focus of infection is present somewhere in the body. Pyelitis rarely develops in a kidney pelvis that is in itself normal, but if by any means injury or congestion is caused, then infection may readily take place. The most frequent exciting causes of pyelitis are: (1) the infectious diseases; (2) exposure to cold; (3) venous congestion as in (pregnancy, movable kidney, and abdominal tumours, all of which may produce obstruction to the outflow); (4) drug irritation; (5) perinephritic inflammation; (6) calculus.

Many authorities agree that chronic foci of infection account for a large percentage of these urological lesions, either by selective action, or by lowering the individual's resistance, thereby rendering him more susceptible to disease. Foci of infection are potential danger points from which from time to time bacteria may enter the blood stream and cause disturbance in parts of the body which for any reason may have lowered resistance. The infectious agent is usually a streptococcus or staphylococcus which has a special affinity for kidney tissues; these frequently prepare the way for the colon bacillus, which it is said is found in about eighty per cent of all cases of pyelitis. The colon bacillus, however, is seldom the primary invader, except possibly in cases of obstruction in the lower urinary tract, but is usually present in all chronic cases, while in acute cases the streptococcus or staphylococcus is more frequently found.

All demonstrable foci of infection should be removed for two reasons: There is the possibility that it may be the direct cause of the infection, and it removes unnecessary infection, thereby giving the individual additional resistance to combat his urinary infection. A chronic urinary lesion may lie dormant many years, and then be lighted up by some condition producing lowered vitality. Its course is often of long duration.

Pyelitis is a very common cause of unexplained pyrexia. If fever is present, associated with an increase of frequency in micturition or with strangury, the urine should be examined very carefully; in women especially pyuria and fever usually means pyelitis. Increased frequency in many cases seems to bear no relation to the state of the bladder wall; in many cases it is due entirely to the bacterial infection of the kidney pelvis.

The female is more subject to prolapsed kidney than is the male. With the prolapse a kink in the ureter often occurs giving rise to a partial obstruction with consequent dilatation of the pelvis; and as a result a lessened function of the kidney itself. It is well known that a grossly mobile kidney encourages inflammation, and does so chiefly because any kinking of the ureter produces a temporary retention, and thus congestion of the kidney tissue; with this congestion and stasis we get a lowered tissue resistance, and as a consequence of this lowered resistance infection takes place more readily.

The following case of pyelitis came under my service on April 15, 1925.

Complaints.—Pain in the right side, extending into the groin and inner side of the right leg, with frequency of micturition, nausea, and vomiting, and fever, with rigor.

Family History.—The patient had suffered from trouble in her right kidney for about five years. Every now and then if she worked too hard, or was exposed to any chill, she was compelled to go to bed with severe pain in the right side, fever with rigors, increased frequency of micturition, nausea and vomiting. These attacks usually lasted from a few days to a fortnight, and occurred every few months. Her menstruation never ceased, but came on at irregular intervals,

sometimes every two or three weeks. These so-called periods usually lasted about four days.

Present Illness.—The present illness began on April 13, 1925, with severe pain in the back and right side of the abdomen, extending down along the ureter into the groin and inner part of the right thigh, accompanied by fever and chills, frequency of micturition, rapid pulse, nausea, and vomiting. When I saw her on April 15, her temperature was 101°; pulse, 104; respirations, 24.

Physical Examination.—The patient was poorly nourished; she had no teeth, but there appeared to be very little trouble in the mouth or throat; the tonsils were in fairly good condition; the heart and lungs appeared to be normal; also the stomach and intestinal tract. The right kidney was large and tender, and lay midway between the costal margin and the anterior superior spine in the mammary line.

The uterus was normal in size, and in good position. The cervix was lacerated and very firm to the touch, irregular in outline, and had a very unhealthy appearance. There was a profuse discharge from the vagina. The perineum was torn.

Laboratory Data

Examination of Blood.—Hæmoglobin 70 per cent; red blood cells, 3,521,000; white blood cells, 19,000; polymorphs, 80 per cent.

Urine.—Cloudy, acid, sp. gr. 1021. Albumen; a very heavy trace. No sugar. Pus cells, ++++. No red blood cells. A few hyaline and granular casts.

Wassermann.—Negative..

Specimen from Cervix.—Epithelium regular; round celled infiltration, and free blood in the tissues beneath the surface; stroma dense, and fibrous; few glands to be seen. No evidence of malignancy.

Diagnosis.—Chronic endocervicitis.

X-ray Pyelogram.—View anteroposterior. The pelvis of the right kidney was visualized. The major calices were slightly irregular. The pelvis was lying in a horizontal position. The kidney was prolapsed, and there was kinking of the ureter just distal to the pelvis of the kidney. No urinary calculi were seen.

Cystoscopy.—The bladder wall was very congested. The urine from the right kidney was cloudy, amber. Sp. gr. 1020; heavy trace of albumen. No sugar; a few hyaline and granular casts. Cell count white blood count—400 per cent mm. Red blood count—none.

A direct smear showed a Gram-negative bacilli; no tubercle bacilli were found. Culture after forty-eight hours gave colon bacillus. After being in the hospital a few days, the inflammation of the kidney appeared to lessen, but after April 25th no further improvement took place under a thorough trial of the usual urinary disinfectants. It was then decided to give some attention to the diseased cervix. On the 9th of May, a specimen was removed, and a biopsy done, with the pathological report of chronic endocervicitis. No malignancy.

On May 14th, a Schroeder's amputation of the cervix was performed and all the diseased tissue removed. The temperature and pulse immediately became normal and remained so; the urine cleared up completely in a few days, and has been free from pus and bacteria until the present time. The patient has had several attacks of pain in the right side since leaving the hospital, but urinalysis has never shown any sign of renal inflammation since that time.

In movable kidney, pain may develop when the ureter becomes kinked or when intrapelvic renal distension occurs from whatever cause; any condition lower down in the urinary tract which gives rise to back pressure in the kidney will cause pain in that organ. In this particular case, however, it is fairly evident that kinking of the ureter in the ptotic right kidney was the sole cause of her discomfort.

In this case we have a history of focal dental infection together with a chronic infection of the cervix uteri; we have a displaced right kidney with, at times, kinking of the ureter. We feel justified in saying that the condition in this patient was due to a focal infection with the existence of some stasis in the urinary tract.

XUM

Editorial

THE PLACE OF MEDICAL HISTORY IN THE COLLEGE CURRICULUM

FOR the first time in its history the British Medical Association has instituted a Section of the History of Medicine. It was fitting that this innovation should have been tested in Edinburgh, inasmuch as the University of Edinburgh is one of the few institutions that has provided teaching in this important subject, and has done so since 1908.

The President of the Section, the Lecturer on the History of Medicine in the University of Edinburgh, Dr. John Comrie, in his introductory address, which was largely an *apologia*, remarked that there was no medical school in Great Britain that required its students to study the history of their subject, and there were few colleges at which instruction of this kind could be obtained. He stated, also, that he had received many letters of approval from persons in Great Britain, the continent of Europe, and America. It is noteworthy that it was decided to consider the subjects to be dealt with in the Section from the "practical" rather than from the "antiquarian" standpoint. Accordingly, a discussion was arranged for on "The historic evolution of disease." Evidently, the officers of the Section did not feel quite sure of their appeal.

On this side of the water, as in Great Britain, there is a growing consciousness of the importance of the History of Medicine, not only as a study for its own sake, but as a valuable instrument of culture. Twenty years ago McGill University established a Chair of the History of Medicine. Toronto University has had one since 1924. Besides these, there are a number of active societies in various cities of Canada devoted to the study of the subject, some of them largely composed of medical students. Such are, the Osler Society of Winnipeg, the Harvey Club of London, Ontario, the Osler Reporting Society at McGill University, and the Osler Medico-Historical Club of Halifax, N.S. Probably, there are others. The same is true of the United States. Some of the larger universities now possess Chairs on the History of Medicine. A notable one is that recently founded at Johns Hopkins, the incumbent of which is the veteran and internationally known pathologist, Professor W. H. Welch. All this goes to show that there is a change coming over the spirit of our dreams. At the same time, we have not yet reached the point when this subject has been made obligatory, as part of the approved medical curriculum.

The reproach has been levelled at the medical profession, and it has even appeared in print, that its members are the worst educated of the three learned faculties. The legal fraternity are expected to know something of the history of their subject, the Institutes of Justinian and the Code Napoléon. Theologians study, as a matter of course, the history of the Church and Comparative Religion. Even by such "practical" people as chemists, physicists, and engineers the story of the development of their particular branch of science is now regarded as a valuable subject for study. Why should the physician lag behind? One reason for the present state of things is, doubtless, that our curriculum makers hesitate to put one more straw, perhaps the last (?), on the back of the already overburdened camel. Probably, a more pertinent reason is that they have not quite awakened to the importance of the subject in the training of the well-rounded medical man. Medicine is today pre-eminently an experimental science and, therefore, there is manifested a tendency to scout hypothesis. We are apt to forget that a good working hypothesis becomes a theory and a theory may become a demonstration. More than one proof of this could be adduced, culled from the history of the past. The theory of the alchemists that the heavenly bodies conditioned man's fate here on earth and his physical health, was not so far fetched, when we recall the present day studies on the effect of climate, sunlight,

ultra-violet rays, and such like external physical agencies upon metabolism. The search for the philosopher's stone, whereby the baser metals could be converted into gold, finds its modern counterpart in the inverted concept of the transmutation of the elements, through the loss of radium emanations, into lead. It ill becomes us to think that ideas in regard to disease and its pathogeny that have come down to us from the past are only fit for the scrap-heap. We are apt, also, to overlook the fact that the men of previous generations had as good brains as our own. The schoolmen of the thirteenth century, while it is true they contributed nothing to the material benefit of the world, did nothing to break the shackles of disease, hindered rather than helped the advance of physical science, yet gave an exhibition of mental keenness and perfection of logic which has not since been surpassed. It does not do to despise the intellectual calibre of the men of old. Even a slight acquaintance with the history of medicine leads to the conviction that our predecessors, if they did 'see visions and dream dreams,' saw visions and dreamed dreams that came true. The Greeks and Romans knew of the association of malaria with marshes; the French term for malaria—'paludism'— still embalms for us this concept. The word 'malaria' itself, 'bad air,' connotes a similar idea. It is within our own recollection that the mosquito, bred in the marshes, has been shown to be the special vector of the disease. Rhazes (A.D. 1000) gave a classical description of small-pox, accurate even today, but it was not till 1675 that Sydenham differentiated this disease from measles. It is not too much to say that a knowledge of the medical history of the past would have materially hastened the more scientific day in which we are now living. Had medical men been familiar with the history of their art, it is not likely that so capital a procedure as ligation of bloodvessels to control hæmorrhage would have been twice introduced and twice forgotten. Had they known of Theodoric of Bologna, of Salicet, of Henri de Mondeville and of Ambroise Paré, we should not have had to wait for Lister to show us a rational way of handling wounds.

The history of medicine may be studied in the human and animal remains of remote periods of time (palæopathology), in hieroglyphics, painting, sculpture, and in manuscripts and books. In this way we can get a more or less accurate idea of the forms of disease that have prevailed in the past, their geographical distribution, and their types or variations from types. Some diseases, such as leprosy, hydrophobia, and small-pox, are tending to disappear. Some, like scarlatina, are becoming milder in type. Possibly other are gaining in virulence (*e.g.* influenza). Some, like cerebrospinal fever, are striving for a foothold. A fuller study of the great epidemics of history may indeed reveal important facts.

The bearing of epidemic diseases, such as malaria, typhus, small-pox, plague, and the sweating sickness on the march of history and the fate of nations has in the past been too little appreciated.

The study of medical history, too, has a distinct cultural value. The actual facts recorded may be well known and now even commonplace, but we find many contacts with the wider worlds of psychology, philosophy, religion, anthropology, biology, and sociology, a knowledge of which cannot fail to broaden our outlook and engage our sympathies. Few who are acquainted with the subject will doubt that it has a distinct place in the curriculum of the medical college, and from being the Cinderella of the course might well be given a more exalted position. Attendance on the lectures should be made compulsory. A properly planned course on medical history, far from being an added burden, might be so presented as to be a positive relaxation and a delight. Apart from the academic aspect of the subject, much can be done to increase interest in medical history, especially that of our own country. There must be many "oldest inhabitants" in the medical persuasion, who could give interesting accounts of their early days in practice. The *Journal* would welcome such. Perhaps, the gain to practical medicine might not be great, but we would get many interesting side-lights on human nature, and on manners and customs in the early days of Canada. Now is the time to do this. It will soon be too late. We welcome the appearance of Dr. J. J. Heagerty's new book on the History of Medicine

in Canada, as representing a move in the right direction.

Sir St. Clair Thomson, in the discussion that took place in Edinburgh on Sir Humphry Rolleston's paper before the Section of the History of Medicine, quoted opinions of two great men which are particularly apropos here: Napoleon said, "The only guide to the future is the past." Goethe said, "The man who looks forward sees only one road of advance, but the man who also looks backward sees two roads."

A. G. NICHOLLS.

REGARDING LIFE ASSURANCE

IT is with much pleasure that we note that the president of the Sun Life Assurance Company, Mr. Thomas Bassett Macaulay, was tendered a banquet on the completion of his fifty years of service in the Company, in recognition of his ability and the vision with which the interests and activities of the Company have been guided during that period. From comparatively small beginnings with a capital of $500,000.00, of which only a portion was paid up, it ranks now as one of the most important Life Assurance Companies in America. Its activities have increased more than a thousand fold, and its branches may be said to encircle the world. As described by the Honourable Rodolphe Lemieux, Speaker of the House of Commons, at the banquet, the Sun Life Assurance Company is a credit not only to Montreal, but to Canada. Its policy and its policies are safe and sound, and its management may be regarded as representative of Canadian integrity, stability and prosperity.

Life insurance is a modern development; an appreciation of the advantages offered by it dates back only to the early decades of the last century. Indeed, on looking back through the past ages, it is astonishing to note how lightly life was held. Regarded as a matter of chance or fate, hunting, rapine and war afforded numerous hazards, and rendered insurance a most uncertain speculation. Commercial insurance on the other hand appears to have had a slow development in early community life. Traders, driven by fear of loss and consequent ruin, sought protection against the many dangers of that period by co-operation with others and thus sharing risks.

At that early date the greatest risks appeared to be at sea and one of the earliest references in literature to this modified form of insurance is made by Demosthenes, who speaks of money being advanced on ship and cargo to be repaid with heavy interest if the voyage prospered. but not repaid at all if the ship were lost.

Danger of loss from fire at an age when buildings consisted almost entirely of stone or baked clay, did not appeal in the same degree as a risk to be dreaded. Later on, however, in feudal times, the houses of vassals were rebuilt at the expense of the landowner. After the great fire of London, in 1666, a strong demand was made by the sufferers that the city itself should insure the houses of its citizens; this demand was passed by the council, but not allowed by the courts, who deemed it beyond the power of the city's charter; thus putting an end, at least temporarily, to the socialistic theory that insurance is properly the duty or burden of the general government.

At that date, unfortunately, no statistics existed on which rates of insurance could be properly based, and only the competition of capital checked the extortionate demands of underwriters. Both marine and fire insurance were developed under the pressure of necessity.

Life assurance, on the other hand, had its early contracts based on the scientific study of the statistics of human mortality. Dr. Edmund Halley (1656-1742) mathematician and astronomer, compiled about the year 1690 the first table of mortality rates. No parish register in England at that period kept a record of the age of death, so he was obliged to look elsewhere, and was fortunate in securing from the City of Breslau a record for five years of its births and deaths, with

the age at death stated. His systematic arrangement of the facts thus obtained proved of great advantage, exhibiting at a glance essential data for the valuation of life risks. This Breslau table, although prepared on what was afterwards shown to be very imperfect data, long remained the only serious attempt to utilize registered mortality facts for scientific purposes. Notwithstanding the advantages offered, life insurance throughout the early eighteenth century was appreciated only by a few, and its charges were irregular and very speculative. In 1753 James Dodson of London started an office to insure life risks in which premiums, for the first time, were calculated according to the age of the insured. Experience, however, proved that the corporate form was a necessity for all successful insurance. Private companies covering only a small number of policies guaranteed by a small group of risk-sharers proved too speculative and frequently ended in disaster. Capital greater in amount than could be secured from private means was demanded for an effective and valid guarantee. In accordance with these developing views, the Equitable Life Assurance Society of London made an attempt at organization, but when its directors petitioned for a charter in 1765 they were refused by the law officers of the Crown on the plea that their scheme depended for success on tables of life and death, wherein the chance of mortality was attempted to be reduced to a standard; this they regarded as mere speculation. The society then became organized as a voluntary association, and Dr. Richard Price was consulted on the developing science of life contingencies. After much study he devised new tables which enabled him to compute premiums on lower figures than previously. Evidently his tables were regarded as a success, and he acquired the reputation of being a good mathematician, for in 1786 Pitt, then Chancellor of the Exchequer, consulted him on plans for the conversion of the public debt. As one result of his advice annuities, which had been granted with little reference to the age of applicants, were more carefully considered. Not until 1828, however, after the treasury had lost two millions of pounds from the sale of them at too cheap a rate, was the law authorizing annuities finally repealed.

In spite of defects arising from the imperfect statistics obtainable at that date, Dr. Price's Northampton tables remained for almost a century the most reliable for the reckoning of insurance rates. As years passed, however, and individual companies obtained records of their own, more perfect tables were constructed. Furthermore, it is to be noted, that in the preparation of these tables, the work of Dr. William Farr and his successors in the British Statistical Office proved of invaluable service, affording for comparison the most extensive data available on all mortality rates.

Insurance in all its branches is now recognized as almost a necessary factor, not only in business but in home life. It has greatly assisted general prosperity, replacing a sense of hazard and apprehension by a feeling of security. It has increased self reliance, and contributed in great measure to the health and well being of every community.

The success of life insurance has been, still is and must continue to be, in many of its aspects dependent upon the medical profession. Medical knowledge has supplied in the past many important and valuable facts for the framing of the statistical tables on which its rates are based. Insurance companies must still be dependent, at least in policies for large amounts, on the skill of the medical examiner for their estimate of the probability of the length of life in individuals purchasing policies. The value of every life policy to an insurance company is dependent in great measure on the character and standard of the medical advice that may be given to the policy holder during the years which the policy covers. Prolongation of life is in great measure dependent on the hygienic principles insisted upon by the health officer of the district in which the policy holder may live; and advantageous as it is to the possessor of the policy, the prolongation of life is also distinctly advantageous to the company insuring the life. It is, therefore, not only with a sense of gratitude, but also with a sense of the fitness of the gift, that the *Journal* desires to acknowledge the financial assistance given to the profession by several of the large

insurance companies in England* and in America. The Canadian Medical Association in particular is indebted at the present, to the Sun Life Assurance Company for funds enabling it to maintain post-graduate lectures in outlying districts of every province, by this means bringing recent advancements in knowledge within reach of all members of the profession. As unquestionably insurance companies profit greatly from everything favouring the prolongation of life, it is therefore just that they should foster every altruistic effort of the profession to fight tuberculosis, syphilis, and heart disease. Such donations are certainly twice blessed; they bless the association that gives, and the profession that receives. It may also be added that they are a blessing to the general public.

* *Vide.* Gift of the Prudential Society of England, *Lancet*, 1927, 30, also p. 1558 of this issue.

EUGENICS AND THE MEDICAL PROFESSION

EUGENICS, or the "science which deals with the influences which improve the inborn qualities" of an individual has two aspects, which we might designate the positive and the negative. The former is the production of a superior race by breeding only superior persons; the latter is the prevention of an increase of defective people in the population by educating them not to reproduce their defects. Physicians, who by the very nature of their profession are concerned with the physical and mental well-being of the race, should be interested in this movement, which aims at the betterment of the people by such preventive methods.

The positive aspect of Eugenics is particularly applicable to animals, where by proper selection of the mates we can breed a stock which shows the desired qualities to a greater or lesser degree. Certain traits can be eliminated, others emphasized in this manner. The animal breeder does not attempt to raise the general level of the herd by weeding out the poor ones; he strives to create a better strain by breeding only the best. Although it is impossible in the human race to determine which persons are pure for certain desirable qualities, because we cannot know their genetic constitution, nevertheless much may be accomplished in this direction through the education of the race to hunt for their mates among those who show only physical and mental fitness. By repeatedly choosing only those who are desirable as parents, we will not be able to breed geniuses, it is true, but we can produce a race that shows a higher average.

Unfortunately, there are those who condemn the entire eugenic programme, because it is impossible to create at will a race of superior people, for as experience has shown, by no means all the progeny of gifted people are gifted to the same degree, if at all. Moreover they advance the argument that one cannot control the curious mental reaction of "falling in love." Merely because we cannot produce geniuses is no reason why we should not strive to produce normal, healthy people. As to the latter objection, we can mention the fact that education in this respect will do a great deal. Just as there is a mental and emotional barrier between persons of different races or fundamentally opposed religions, so that there is very little tendency for intermarriage between the yellow and white races, or between those of the Jewish and Christian faiths, just so by a few generations of training there can be established the same emotional immunity between the normal and the hereditarily defective person.

In the series of papers dealing with hereditary abnormalities of the eyes, which is concluded in this issue, a very practical side of Eugenics is stressed, and the deductions and recommendations made there have their foundation in the application of modern genetics, as far as possible, to the conditions discussed. A glance at some of the pedigrees published in these articles will reveal how great the need for improvement is. What untold suffering, what hopes dashed to the ground for young men and women, who just at the beginning of their careers find themselves handicapped by the onset of unending darkness; what mental anguish endured by

parents, who dreaming of the future full of promise for their children, find that they themselves have bestowed upon their own flesh a heritage from which there is no release save death; what torture for the children, who aware of their probable doom, await a night that knows no dawn!

Nor is blindness the only defect which is inheritable; their name is legion, and their aspects, manifold. Some are so slight as to be negligible; others so serious as to mean the ruin of a life. Some do not interfere with the normal activities of the individual; others so incapacitate him that he becomes a charge upon the family or the public. How is all this to be remedied? Only by education of the profession, who must be made alive to the importance of the question, by and through them, the enlightenment of the public at large.

The objection will of course be made that education alone will not suffice; that after education must come legislation preventing the marrying of such defectives, and that here we are interfering with Nature and man's inalienable rights. Such persons will deplore the condition of affairs, but feel that there is no alternative; that no human being should have such power over another as to refuse him the right to marry or to procreate offspring. May it not be that sometime in the future, we will realize that no human being has the moral right to condemn another to a life of physical or mental abnormality? What would be the judgment of society upon a man, who, setting before his child two glasses, both containing apparently the same fluid, said to him, "In one of these is a harmless drink, in the other a poison which will blind you for life. I cannot help you in your choice for I myself do not know which is which. One of them, however, you must drink." Has a man any more right to force upon his unborn child, not the choice it is true, but an even chance of receiving a defect which will leave it perhaps blind, perhaps mained for life? How long are we to permit ourselves or others to thrust upon the children of to-morrow, a probability so fraught with disaster to them and to the race? Centuries ago men demanded that none should hold in thrall another's mind; freedom of thought and speech were to be the right of all. Years later, men died to defend the principle that no man should enslave the body of another. How long will it be before we recognize that our children, too, have a right to be free; free from a heritage which weakens their minds or cripples their bodies?

Truly the physician has a great task of education ahead and it will take a long time to accomplish it, hence there is more reason to begin it at once. But education of the public is only half the duty of the medical profession. The other half is the research interest, which they must evince in the collecting of information concerning heredity in disease. Who but the physician can make the diagnosis, verify the statements of the patient concerning the presence of similar disease in other members of the family, eliminate cases which to the lay eye are similar, but from the medical standpoint reveal a different etiology, and then, with accurate data, make the pedigree known to the world of medicine through the medium of the medical journals?

In this connection we cannot refrain from mentioning the great English ophthalmologist, Nettleship, to whom we are indebted for perhaps more pedigrees of hereditary eye conditions than to any other person. For years after he retired from active practice, he spent his time writing up cases of his own, tracing out the family history, travelling over the country to verify statements about relations, writing to colleagues in distant cities to solicit their aid when he himself could not go, so that every diagnosis and every pedigree might be as accurate as possible. In addition to this he compiled most of the cases scattered through the literature, so that his articles became a repository for knowledge that was unavailable to the reader otherwise. Such a spirit as his is needed to garner the facts which are the basis of the educational programme in Eugenics.

Nor is this all. Every generation of physicians needs to be taught over again the truths gathered in the past. Many of these are present in the textbooks, but most of those concerning the inheritance of disease can be found only in the scattered original articles, most of them inaccessible to the general practitioner, who through lack of library facilities and time, is thus cut off

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from such information. Hence the value of such a series of articles as have appeared in these pages during the last year; they give the physician the information which he has not time to accumulate for himself.

The facts of inheritance are indisputable; why not let us endeavour to use that portion of our heritage which will promote the future well-being of the race, and discard that which leaves behind those who have bitter reason to regret the day that they were born!

INSULIN AND DIABETES

THE paper contributed to this issue by Dr. I. M. Rabinowitch is an attempt to estimate the value of insulin, for it has now been on probation sufficiently long to permit of such an estimate being made with some degree of accuracy. The data assembled have been analysed with a view to determining how much insulin has contributed to the control of diabetic mortality., and it will be evident that the question is dealt with by one who is not only trained in the mathematical intricacies of statistics, but is also a clinician able to enrich his statistics with a wealth of experience gained in one of the largest general hospitals in Canada.

There is abundant and incontestable evidence that insulin can lower the death rate from diabetes. That is one of the points which is clearly established by this analysis. It is shown, for example, by comparing the number of deaths from diabetes annually amongst Dr. Rabinowitch's large group of cases, that the death rate in his clinic has now dropped to one-fifth of what it was in 1921, just before insulin came into use. And, again, it is shown that the death rate amongst diabetics requiring surgical treatment was 38.1 per cent in the year just before the introduction of insulin, whilst four years later it was 5.2 per cent.

These are impressive results, but when they are compared with similar statistics from other countries a paradoxical situation is revealed, for these latter figures show that diabetic mortality has, *in general*, increased within the last four years.

No explanation of this contradiction can be complete whilst we are ignorant of the etiology of diabetes. What we should realize, however, is that as far as our knowledge now goes, there is no single factor in the treatment of diabetes which is more important than the regulation of diet. Perhaps the advent of insulin served at first to make us lay less emphasis on this point, but if the analysis at hand does nothing else, it ought to prove how necessary it is for us to stress the regulation of diet, rather than the administration of any curative agent that we have yet discovered. Medical men have a duty not only in imparting any knowledge which will lighten human ills, but also in the placing of that knowledge in its proper perspective; and Dr. Rabinowitch has helped to perform this latter service for us in regard to insulin.

H. E. MacDermot

INTERNATIONAL CONFERENCE ON LIGHT AND HEAT THERAPY

IT is announced that the first International Exhibition and Conference on Light and Heat in Medicine, Surgery and Hygiene will be held in London during the coming winter. Those fathering the Conference have come to the wise conclusion to limit its membership to physicians and physicists who are actually working on radiological problems, for at a time when, as the *British Journal of Actinotherapy* remarks, "for the most part we are all tyros together," they feel that the deliberations ought to be kept within relatively narrow bounds. Only in this way can the subject be clarified and real progress made.

The interest, both medical and lay, in the therapeutic powers of the various forms of light and radiation is great and commercial

houses have not been slow to appreciate the fact. Many complicated and spectacular forms of apparatus are on the market, for the value of which therapeutically extravagant claims are being made. The terms "violet" and "ultra-violet" rays, "x-rays," "infra-red" rays, "Finsen light," "quartz lamp," and the like, are juggled with in a most irreverent fashion. Much of the apparatus concerned is of a highly complicated character, and is probably only at the beginning of its evolution. It is certain that we do not yet possess sufficient knowledge regarding the therapeutic range or the proper dosage of the various rays that are employed. Nor do we know certainly the danger limit in the use of such apparatus. Much remains to be done. It is fitting that one of the first subjects to be discussed by the Congress is that of the lamps employed to generate the various kinds of rays. This will tend to crystallize available knowledge on this important matter, of which there is much scattered through the literature.

Regarding the great value of x-rays and radium in therapeutics there can be no two opinions, and the recent work on the antirachitic influences of ultra-violet rays promises to lead to valuable and far-reaching results in many directions. We know, now, for example that these particular rays can confer on substances of the nature of lipoids and cholesterol antirachitic properties. An addition to our knowledge is that ergosterol, an impurity found in cholesterol, becomes when irradiated such a very active antirachitic agent. Cod liver oil may possibly in the future drop into the discard.

Fresh air and sunshine are widely recognized as valuable assets in the business of maintaining and procuring health, and with some have reached the dignity of a cult. Assuming that this is so, to what are the benefits to be ascribed? Are the ultra-violet rays the important factor? Or, is there some other factor at present unknown. Again, how far does, "artificial sunlight" replace the real article? What is the best kind of glass from the hygienic standpoint to use in the windows of our dwellings? Many more questions, too, might be asked. These important subjects are attracting wide attention now, and we are glad to see that research work of real value is being undertaken in Canada, as the excellent article of Drs. Tisdall and Brown in this issue bears witness.

A. G. NICHOLLS.

ADRIAN STOKES

THE death of Dr. Adrian Stokes, at the early age of 40, will stir the interest of more than his immediate circle in Great Britain. The short account of his life and work which is at hand* reminds us of the long and always brilliant association of his family with medicine. His great-grandfather was Regius Professor of Medicine in Trinity College, Dublin, and his grandfather was the great clinician, William Stokes, while his uncle Sir William Stokes was a surgeon in Meath Hospital. Other instances are readily recalled of such hereditary interest in medicine, but in none of the later generations has there been a more brilliant ripening of power than in Dr. Stokes. In the words of one of his professors, "It was recognized early in his student days that the genius of his great predecessor had been reborn in him."

Varied as were his capacities, it was as an investigator from the laboratory side that he showed his greatest promise. The War absorbed him early, but fortunately he was able to pursue work along the lines for which he was best suited. He took with him a motor bicycle and side car packed with laboratory apparatus, a type of the mobile laboratories which were developed later on. He played no small part in connection with typhoid fever problems at the front; he helped in establishing the spirochætal origin of epidemic jaundice amongst the troops, and he was the first to isolate the organism of gas gangrene from the blood stream. His work on jaundice led to his being chosen by the Rockefeller Yellow

* *Brit. M. J.*, Oct. 1, 1927.

Fever Commission to go to West Africa two years after the war.

It was in the years between 1922 and 1927, however, that he settled down to the work which seemed to absorb him most completely, the teaching of pathology in London University at Guy's Hospital. He found pathology in this school a neglected and insufficiently taught subject. He raised the standard of its teaching and enveloped it with an interest which soon attracted the students, so much so that where pathologists before had complained that the clinicians diverted too much of the students' time to their own subject, the clinicians now complained that their clerks and dressers deserted them for pathological classes. Dr. Stokes realized too, as many may, that the complete pathologist has his place in the wards, but he carried out his ideas as only few actually do.

It was with much hesitation over leaving his teaching, that he finally accepted an invitation from the Rockefeller Foundation to visit West Africa again to study yellow fever. Here he devoted himself to a study of the transmission of the disease. The last letter he wrote described with characteristic raciness of simile the success that seemed within reach. He wrote:

> "We are a bit full of ourselves as we have the fish hooked all right, right down in the belly, and unless we are careless and break the tackle it will only be a question of time. The time may be years, but it must come. He rose to a gray monkey in May, and we hooked him fair, early in July, and now we can transfer it by blood or mosquitos at will and can protect the animals by convalescent serum and so on. Of course, the gaffing of the bug will be the thing that takes time, but getting a susceptible animal is a first and essential step."

A few weeks later he was dead of yellow fever himself. He had acquired the disease from the bite of an experimentally infected mosquito, and unfortunately his researches had not brought him sufficient knowledge to provide him with protection against it.

We shall hear later how far his researches had been carried; and doubtless they will prove to be valuable contributions. Nothing of his scientific work, however, will carry inspiration with it as will the memory of the fineness of spirit with which he spent himself on it.

H. E. MacDermot.

Editorial Comments

Professor A. B. Macallum Retires

The many friends of Professor Macallum particularly in Montreal and Toronto, and his numerous students scattered throughout Canada and the United States, will learn with regret that, at the end of the present session, he purposes retiring from the Chair of Biochemistry in McGill University. Professor A. B. Macallum, M.A., M.B., Ph.D. (Johns Hopkins), Sc.D. (Yale, Dublin, Toronto), LL.D. (Aberdeen, McGill), F.R.S., is an outstanding figure among the biochemists of this continent. His career has been noteworthy. Beginning as a master in one of the high schools of Ontario, he graduated from the Faculty of Arts in Toronto with honours and as the silver medalist in Natural Science. He obtained his Ph.D. in the Johns Hopkins University in 1885, after which he returned to Toronto and accepted the positions, first of Tutorial Fellow and Lecturer in Physiology, and afterwards of Professor of Physiology and Biochemistry. His course in experimental physiology at this early date was an unusually complete one. From his first connection with the department the students were taught to make experiments for themselves. The extent of the field covered was increased every year and new apparatus was added, so that in the early nineties his course was one of the most complete on this continent, giving to the students a full account of the then very advanced views of van't Hoff and Arrhenius on physical and colloidal chemistry as applied to biochemistry. Of the many additions to our knowledge which have been made by his investigations, we hope at a later date to make full reference.

In 1920, he accepted the appointment to the Chair of Biochemistry at McGill University, and all those who have been associated with him during these past years will join with us in regrets over his resignation from active teaching life.

Professor J. B. Collip Comes to McGill

James Bertram Collip, M.A., Ph.D., M.D., D.Sc., has been appointed to the Chair of Biochemistry in the Medical Faculty of McGill University. He graduated with special honours in physiology and biochemistry in Toronto in 1911, and shortly afterwards entered upon a graduate course in these subjects, obtaining his degree

of Ph.D. in 1914. Shortly after graduation he accepted the appointment of Lecturer in Biochemistry in the University of Alberta, obtained his Doctorate of Science in that institution and was later promoted to the Professorship. He obtained his M.D. degree a few years ago, and was elected to Fellowship in the Royal Society of Canada. Although now only 35 years of age Professor Collip is recognized as one of the leading biochemists in America. He won his laurels in connection with the discovery and isolation of insulin, and was made one of the recipients of the sum of money accruing from the Nobel prize. Since then he has done notable work in connection with the parathyroid glands, the active principles of which he has discovered and isolated. As an authority on the biochemistry of the endocrine system in particular, Prof. Collip has few equals. Professor Collip was a student under Professor Macallum and has had a training such as few biochemists have had before specializing in their work. This knowledge of the sciences at the foundation of physiology and biochemistry has enabled him to achieve results of an outstanding character.

He has, moreover, many of the qualities of a great teacher and leader and McGill University is to be congratulated on having him on its staff. All the more so in view of the numerous opportunities that have been afforded him to fill important posts in other universities.

On the Tobacco Habit

In the Norman Kerr Memorial Lecture recently delivered by Professor Dixon of the Pharmacological Laboratory, Cambridge, before the Society for the Study of Inebriety, which we publish in this issue, we have been given a most interesting and exhaustive study of the effects of smoking both on the health of the individual and on the population as a whole. Few persons are able to speak on this subject with the authority of Dr. Dixon. He opened his address with the quotation from Disraeli that "the youths of the nation are the trustees of posterity"; and then referred to the numbers of men rejected as unfit for military service in the late war. Few at the present can doubt that British stamina leaves much to be desired, if it is not indeed on the wane. No excuse therefore was necessary in calling attention to certain known facts regarding tobacco smoking, which in Canada, as well as in Great Britain may well receive careful consideration. After dwelling briefly on the history of its introduction into Europe the speaker went on to state that it was not really till post-Victorian days that the respectability of smoking was established. Women were the most bitter opponents of tobacco till this time. With their emancipation a large number of women promptly started to smoke, and now it would seem to be unusual for either maid or matron to abstain.

During the last fifteen years an enormous increase has taken place in the consumption of tobacco. In America the number of cigarettes consumed in 1914 was 3,000 million; in 1918, after the war, this had increased to 46,000 million; but the figure continues to increase, and in 1921 it reached 52,000 million. The *per capita* consumption of tobacco in the United States of America in 1920 was 6.3 lb.; in Great Britain it was 3.17 lb. Increased consumption appears to obtain in all European countries. In Holland smoking is especially prevalent. In 1924, 2,500 million cigarettes were consumed at a cost of 3½ million pounds; some statistics show that of 100 boys aged 6 years, 30 smoked; of boys between 9 and 10, 50 smoked; and of 250 boys over the age of 11, 220 smoked.

In Austria a pamphlet was published in 1924 by several of the most distinguished Vienna university professors in which it stated that: "Nicotine promotes arterio-sclerosis and nervous diseases. In our country the cost of tobacco for one day equals the total annual deficits of all our tuberculosis sanatoria which it was necessary to close for economy." In Germany the total expenditure for the German army in 1912 was less than its smoking bill. As a further example of the cost of tobacco to a nation, Professor Farnum of Yale University has estimated that the United States of America in 1921 spent well over 300 million pounds on tobacco.

The formal opening of the new University Clinics and Laboratories of the University of Chicago took place on October 31st. James Roland Angell, president of Yale University delivered the convocation address. Addresses were also given in the various departments by well-known leaders connected with sister universities. Among those who spoke we notice the name of Arthur Dean Bevan of Rush Medical College, Francis Carter Wood of the Cancer Research Institute, Rufus Cole, Director of the Hospital of the Rockefeller Institute, W. S. Thayer of the Johns Hopkins Medical School and Evarts Ambrose Graham of the Washington University School of Medicine.

Sun Life Scholarships

The Sun Life Assurance Company of Canada through its President, Mr. T. B. Macauly has generously undertaken to provide thirty scholarships to aid Canadian salaried tuberculosis sanatorium and diagnostic clinic workers to attend helpful programmes being provided in England, France and Italy in 1928.

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Men and Books

THE FIFTH CHAPTER IN THE HISTORY OF PATHOLOGY

By Albert G. Nicholls, M.D., F.R.S.C.

Montreal

The first half of the nineteenth century saw the foundations of the "cell theory" well and strongly laid. The incorrect and somewhat crude conceptions of Schleiden and Schwann in regard to cell structure and derivation gradually gave place to something like present-day views, as a result of the researches of Barry, Goodsir, Cohn, Cruickshank, Weber, Müller, Virchow, and Remak. The introduction of staining methods and other improvements in technique gradually clarified this most difficult subject. Max Schultze defined the true cell as a nucleated mass of protoplasm, and taught that protoplasm (in the modern sense) is identical in all living cells. Flemming traced out the phenomena of nuclear division, and laid down the aphorism *Omnis nucleus e nucleo*. The researches of Waller, Deiters, Golgi, His, Ramon y Cajal, and Waldeyer laid bare the structure of the nervous system, and brought its components into line with the other, less complicated, cells of the body. The problems of embryology—the maturation and fertilization of the ovum, the extrusion of polar bodies, segmentation, cell ancestry, and the bearing of embryology on the doctrine of evolution—were elucidated by the researches of Flemming, His, Martin Barry, Hertwig, Van Beneden, Huxley, and Balfour. So it has come about that, at the present time, the ancestry and life history of cells, and their relationship to each other in tissues are well understood. Some few points, only, remain to be cleared up, such as the derivation of the leucocytes of the blood and the relationship of certain cells in the connective tissues. This may yet be accomplished by the employment of intravital methods of staining and the demonstration of intracellular enzymes. Indeed, the trend of the work of the anatomist during the last seventy-five years has been from the general to the particular, from the organ to the cell. Anatomy has become largely histology. As a consequence, morbid anatomy has faded into the distance also, but here the parallel ceases, for the cellular pathology of to-day is no longer that of Virchow—based on morphology alone—but is founded on function. Indeed, it is probably safe to say that no further discovery of capital importance will result from study along morphological lines alone.

About the time that the cell was attracting so much attention, other methods of attack in regard to biological problems came into vogue. The good example set by Harvey was not forgotten, and the sciences of experimental physiology and pathology gradually evolved until they have assumed an importance in the elucidation of disease problems the end of which is not yet.

The modern founder of experimental medicine is Claude Bernard. Unlike his master, Majendie, who regarded medicine as a science in the making, and did little more than record observations, Bernard had brilliant powers of generalization, and accordingly his life work and the inspiration it afforded did much to lift from medicine the reproach of being merely an art. The publication of his papers on the glycogenic function of the liver (1847 to 1858) marks a fresh departure. The story of experimental physiology is that of a succession of triumphs and has been charmingly told by the late Sir Michael Foster. If there be a golden thread to be traced here, it is certainly the establishment of the doctrine of "internal secretion" and its corollary, "hormone action."

The term "internal secretion" was introduced by Claude Bernard to explain the nature of the glycogenic function of the liver which he had discovered. The conception itself was not new, however, for de Bordeu in 1774 had expressed the view that each organ of the body produced its own specific substance, which was passed out into the blood, and that on this the integration of the body as a whole depended. His exact words deserve quoting. "*J'en conclus que le sang roule toujours dans son sein des extraits de toutes les parties organiques.....chacun (des organes) aussi sert de foyer et de laboratoire à une humeur particulière. qu'il renvoie dans le sang apres l'avoir préparée dans son sein, après lui avoir donné son caractere radical.*" (*Analyse médicinale du Sang*, 1774, pp. 943 and 948). We seem to get a hint of this, also, in the doctrine of the "four humours," introduced by Hippocrates and popularized by Galen, which had so phenomenal a run. But at the time of Bernard the Galenical philosophy had long been dead, and the prevailing notion was that the animal body was a mere bundle of organs, each of which had its particular and isolated function. Bernard, at once and for all time, put an end to this conception. The first step was taken to establish the proof for what had been with de Bordeu pure supposition. It is but fair to say, however, that to-day many, perhaps the majority, of workers use the term "internal secretion" in a somewhat more restricted sense than did Bernard. Nevertheless, this great physiologist started investigators along a new line, in which chemistry and physics were destined to bulk more largely than morphology.

Not less important was the work of Thomas Addison of Guy's, who was the first to describe disease of the suprarenals (*melasma suprarenale*), in the *London Medical Gazette*, 1849, xliii, 517. His observations were later (1855) expanded into

his classic paper "On the constitutional and local effects of disease of the suprarenal capsules." This work inspired Brown-Séquard to extirpate the suprarenals, whereby he was able very accurately to reproduce the Addisonian syndrome (1856). His results have been amply confirmed by the experiments of Tizzoni, Abelous and Langlois, and Schäfer. Oliver and Schäfer (1894-95) demonstrated the fact that a watery extract (of the medulla), when injected into the blood, could slow the heart and raise blood pressure. Later (1901), Takamine obtained a substance in crystalline form from the suprarenal which produced the same effects. Five years more and this active principle was prepared synthetically. Finally, several observers have shown that the 'pressor' substance isolated from the suprarenal medulla can also be obtained from chromaphil cells generally.

A not less remarkable triumph of research is to be chronicled in regard to the thyroid gland. Exophthalmic goitre, which, by the way, should be called "Parry's disease" rather than Graves' or Basedow's disease, was described by Parry (1786), Graves (1840), and Basedow (1845). Myxœdema was described by Curling (1850) In connection with both these diseases attention was focussed on the thyroid gland. Following up clinical observations by experimentation. Moritz Schiff excised the gland in the dog (1856) with fatal results, and in 1884 the same observer proved that death in such cases could be prevented by previously grafting in thyroid tissue. Reverdin and Kocher (1882-83) noticed that *cachexia strumipriva* resulted from thyroidectomy. Horsley and Semon showed that cretinism, myxœdema, and cachexia strumipriva were essentially the same (1884-86). Then came the brilliant application by Murray of the knowledge thus acquired to the treatment of myxœdema by thyroid feeding. The isolation, by Baumann (1896), of iodothyrin pointed to the relationship of the thyroid gland to iodine metabolism. An equally interesting story might be told in connection with the other ductless glands, particularly that of the pancreas and insulin. On these crucial experiments has been based the doctrine of internal secretion.

Another enormous advance, opening up new fields of exploration, was the discovery by Bayliss and Starling (1902) that the external secretion of the pancreas was due, not to a local reflex, but to the action of a substance (secretin), produced by the duodenal mucosa as a result of stimulation by the acid products of gastric digestion, which "secretin" entered the general circulation, was carried to the pancreas, and excited its activity. Their observations were supported by the discovery of *enterokinase* by Pavloff and his pupils somewhat earlier. As a result, Bayliss and Starling developed the "chemical messenger',' or "hormone," theory in connection with internal secretion.

That there are correlations between the various internal secretions, including the hormones, is now widely accepted, and the belief is common that disordered action of one of the glands of internal secretion leads to disturbance of others in the system. The now familiar expression "polyglandular syndrome" expresses this concept. It should be remarked here, however, that in this connection zeal has undoubtedly outdistanced knowledge. In brief, it may be stated that the correlations referred to are numerous and complicated. The chief are, that there may be an absolute or a relative over-action of one of the glands of internal secretion, an absolute or a relative under-action of its antagonist: a deficiency of the activating "hormone" or of the depressing "chalone:" the secretion of one gland may act as a hormone on another gland and as a chalone or restraining agent on a third. These are purely quantitative effects, but it is conceivable that qualitative ones occur as well. It seems probable that these related actions are made possible through the mediation of the sympathetic and autonomic nerve systems. We are beginning to apprehend something of the importance of the internal secretions in connection with such matters as the growth of the body, the development of the sexual characters, the emotions, the functioning of organs. We may find here also, a clue to the solution of some of the hitherto unsolved problems connected with heredity.

The third great advance during the period that we are dealing with is the establishment of the "germ-theory" of disease, through the pioneer work of Pasteur, Lister, Koch, Roux, Klebs, and many others. Thus, a large proportion of maladies, hitherto not well understood, were brought into the etiological category of the known. A logical outcome of this, also, was the development of the science of immunology, as a result of the study of the life-history of the various micro-organisms and the reactions they provoke in the animal body. The discovery of toxins by Brieger (1888), and of antitoxins by Behring (1890-93): the discovery of the bactericidal power of the blood serum by Buchner (1889), of opsonins by Denys and Leclef (1893), and of bacteriolysins by Pfeiffer (1894) laid the scientific foundation of the prevention and cure of many of the microbic diseases.

Thus, it has come about, owing to these remarkable discoveries, that we are paying more attention to the fluids of the body and less to the cells: to the secretions, excretions, hormones, and immune-bodies, in short, to "the humours." Pathology is now regarded as perverted physiology, and its problems are chemical and physical rather than morphological. We hark back, indeed, to Boerhaave's aphorism:—*Morbus est vita praeter naturam.*

Granting all this, it is evident that function must be dependent on and conditioned by structure. We are inevitably brought back to the cell. It will be useful, therefore, to enquire how far we have deviated, if at all, from the principles laid down by Virchow.

XUM

There are, and have been always, two opposing ideas in regard to natural phenomena. Aristotle laid down the principle of entelechy, or intelligent design, to which all phenomena in nature are subordinated. This led in biology to the recognition, as causes of phenomena, of vital or metaphysical forces. Inevitably, it led to loose thinking and wild speculation, and drew men's minds away from the real causes of events. Contrasted with this is the view of Kant, who taught that natural phenomena must have objective causes which rest in nature, and that such forces and teleological conceptions as lie outside of nature must be rejected as adequate explanations. The spheres of natural science on the one hand and philosophy and metaphysics on the other are in fact incommensurate. Virchow founded his work on the philosophy of Kant, and was enabled to sweep away the numerous speculations which were rife in his day, and substitute an objective conception of living precesses. We must gain our knowledge of disease from observation, and our conclusions as to the nature of disease must be based on this experience, and be drawn in accordance with the natural laws of cause and effect. For Virchow there was no real difference between the laws that govern health and those that govern disease, *i.e.*, there is no essential difference between physiological and pathological processes.

It is probable that Virchow, in his reaction against the vague conceptions of his day, laid too much stress upon the cell as such. The "Baustein" conception, in which each cell is an independent unit in a "cell-state" is too rigid. We know now that the cell is not the final unit of living matter. It has many differentiated parts, such as the nucleus, chromosomes, centrosomes, fibrils, colloids, molecules, and ions. The bacteriophage of d'Herelle may ultimately prove to be the biological *reductio ad minimum*, as d'Herelle and some others hold. Also, there is reason for thinking that the intercellular substance is not dead, as Virchow, and especially, Weigert, held, but takes its share in metabolism. Again, Virchow identified "disease" with "diseased cells." We now look for "disease" in the organism as a whole. For us the body is not a "cell-state" but a "living cosmos," as Heidenhain has taught. The tendency now in medicine is to place the attention on constitutional factors, to put the emphasis on the individual and on individuality, on "humours" rather than "cells." This is not to say that the cell is of trifling importance, but we hold that it is the unity and continuity of living matter that counts. Important as cell and tissue changes are, they are inadequate to explain the processes of life and abnormal life (which we call disease), unless we regard them in their relations to the structure and formation of organs, and, again, consider the organs in their relations to one another and to the organism as an individual whole.

Special Articles

FOOD AND PHYSIC*

By Sir John Bland-Sutton, Bt.

London, Eng.

Food may be defined as anything which sustains, nourishes, or augments the body. Physic is a remedy for disease. It is impossible to draw a line between food and physic. From the earliest times it has been the custom in all countries to administer to sick persons parts of animals and even their secretions as physic for disease.

In 1654, Nicholas Culpeper, gentleman, student in physick and astrology, published the sixth edition of The London Dispensatory, a curious and amusing book, containing much advice in regard to living creatures and their secretions for their use as remedies for many affections. His list contains among other living things, ants, grasshoppers, scorpions, wood-lice (millipedes), earthworms, vipers, frog's liver, scrapings from the horn of the unicorn, the tusk of an elephant, and the hoof of an elk, brains of sparrows and hares, goose grease, bear's grease, ambergris, spermaceti, and lard. The herbs recommended by Culpeper are so numerous that they may be comprehended in this neat Kipling couplet:—

> "Anything green that grew out of the mould
> Was an excellent herb to our fathers of old."

Out of the ancient hotch-potch of remedies recommended in the Dispensatory of the Royal College of Physicians, London, 1746, such things as gum, amber, pearls, crab's claws, viper fat, and viper wine, ox-gall, castor, and lard are included. To-day physicians of repute recommend as physic many animal extracts, pituitrin, adrenalin, insulin, and:—

> Costly musk from the musk deer,
> Raw liver from calf and steer.
> Ambergris from sick sperm whales,
> Rich beef-tea from long ox-tails,
> Honey made by busy bees,
> And testes from chimpanzees.

Truly, the old faith in a new form.

The Glandular Pantheon

One of the most important discoveries made

* Delivered at the Centenary Celebration, University of Toronto.

within the memory of many in this room relates to those glandular organs possessed by man in common with amphibians, reptiles, birds, and mammals, known as ductless glands. These curious bodies puzzled anatomists for centuries; and physiologists failed to assign them a function. One, the pineal gland, was regarded by a famous philosopher as the seat of the soul. Some of them are conspicuous, but the most remarkable—the pituitary body—is stowed in the most inaccessible recess in man's skull.

It is now established that the secretions of the ductless glands—pituitary, thyroid, adrenal—are very powerful and govern the growth and development of the body. They control our health and happiness in such a way that we may describe our childhood, adolescence and mentality as being governed by a glandular pantheon.

The pituitary body (hypophysis) in a healthy man is about the size of a cherry-stone. In a giant it may be as big as a walnut, equal to the bigness of the pituitary body in an Asiatic elephant. The comparative anatomy of the hypophysis offers an interesting field for investigation. The value of ductless glands in the animal economy can be demonstrated experimentally. When tadpoles are offered ox thyroid they nibble it greedily, and in these circumstances the time required for their transformation into frogs is shortened by one-third (Boulanger). Thyroid extract given to the stunted children known as cretins makes them grow, and sometimes transforms them into efficient citizens. Glandular therapy is very important, and there are reasons for believing that a biochemical laboratory may become as essential to a hospital as the dispensary.

Whilst physiologists are devoting excited attention to ductless glands and finding new wonders at every stage, they are apt to forget in their excitement the debt owing to glands with docts especially the udder of the cow.

Milk

Two of the earliest recollections of English children are milk and cod-liver oil—one as food, the other as physic. Medical literature abounds in references to accessory food factors called vitamins, especially vitamin A which exists in milk and cod-liver oil. It is also present in green plants, on the land and in the sea.

Modern biology tells us, with repeated reiterations, that plants make food material from inorganic soluble substances, water, and carbonic acid. Animals require the same essential food substances as plants, but must obtain it from plants. This is no new thing, proud Science! One thousand years before Christ the Psalmist sang:—

> He causeth the grass to grow for the cattle and herbs for the service of man: that He may bring forth food out of the earth; and wine that maketh glad the heart of man, and oil to make his face to shine and bread which strengtheneth man's heart. (Ps. 104).

Milk is an important food substance all the world over, and milk of the cow is most useful. Its constituents render it a perfect food for the wants of the young for whom it is provided. Every sucking babe is a little cannibal living on its mother. Though milk in some form is a universal food, it is true that in large cities it may be described as the most polluted article of diet. The cow is a useful machine for turning grass into milk, amazing in quantity and richness. She spends the early morning in cropping grass with her tongue and teeth and collecting it in the paunch. When this compartment of her complex stomach is full she retires to a shady spot, and reclining on her side, chews the cud. With slight flicks of her flank she sends bolus after bolus of sodden grass from the paunch up the gullet to her mouth where it is ground into small pieces by her molar teeth. It is then reswallowed and unconsciously propelled to the manyplies (omasum) for thorough trituration. In the fourth compartment the grass is submitted to the action of gastric juice and rendered fit for absorption. Ultimately it is withdrawn as milk from the udder, by a calf, a milkmaid, or a cowherd. The stomach of cows is not merely a churn; it is also an incubation chamber where digestion is aided by bacteria. The chief defect of the cow as a milk-producer is the great liability of the udder to become tuberculous and freely discharge tubercle bacilli with its milk.

Cod-Liver Oil

In December, 1872, *H.M.S. Challenger* set out on an exploring expedition. The voyage which lasted four and a half years is without parallel in the history of research for the work achieved; nearly twenty years were required to work out its results. In the course of the voyage it was discovered that the marine flora and fauna could be arranged in strata. Of these the principal is known as the plankton, (wanderers) and includes the stratum containing living forms that swim actively with the aid of cilia; and those that are carried by currents, or float at, or near, the surface. All of which may be aptly described as the drifting population of the sea. The animals of this stratum are for the most part small in size, but exist in enormous numbers and serve as food for the larger inhabitants of the sea. Many live as parasites on fishes and other aquatic animals.

Just as our meadows vary in the degree of growth and luxuriance of grasses, herbs and flowers, so the species and varieties of animals

vary in the plankton. In the plant world there is a period of rest followed by a procession of flowers and fruit from April to August, so there appears to be seasonal variations in the fauna of the plankton. In the winter months the activities of marine animals are low. Many fishes hibernate and others become sluggish and inert. Living on their reserves to produce eggs and spermatozoa they become thin. In the spring and early summer myriads of marine animals disport in the surface water, which also swarms with spawning products—sperm, ova, larvæ, in a manner very similar to the stratum of the atmosphere in immediate relation with fertile land which abounds in insects, bacteria, and pollen.

It may seem strange that creatures of the plankton could have anything in common with the health of children, but we know that the planktonic fauna is the original source of vitamin A in cod-liver oil.

Vitamin A

Reference has already been made to an accessory food factor known as vitamin, and biochemists tell us that what they call vitamin A exists in milk and cod-liver oil. I have given the leading facts of milk production from grass by cows. Cod-liver oil is made by a more complicated method.

Fishes, like mammals, draw the whole of their store of vitamin from plants: it is contained in green seaweeds—algæ which are eaten by the fauna of the plankton. These small creatures, such as copepods, amphipods, decapods and the like, are devoured in enormous numbers by squid and certain molluscs. These in turn are eaten by cod and other fishes. Nearly all fishes are carnivorous and devour each other, even their offspring! *Eat and be eaten,* is the rule of the sea.

The Pastures of the Sea

Whales, mammals wonderfully adapted to live in the sea, yield animal substances in quantities sufficiently valuable to make them worth capture. They are not only the largest mammals known, but the fattest. Hair is as characteristic of mammals as feathers of birds. Whales have a smooth skin with very little hair, but they have a thick layer of subcutaneous fat—blubber—which serves the purpose of hair in retaining the heat of the body. The blubber in a fat whale 60 feet long will range from 8 or 10, to 12 or 15 feet, in thickness. The amount of oil expressed from this will yield 100 barrels of oil. This gives 10 tons as the weight of oil in the animal's skin, a lake of oil. Warmth is indispensable to these huge beasts as it is to man. When a seaman falls overboard in the whaling grounds in the Arctic or Antarctic seas he is quickly killed by cold.

The right whale feeds on the small creatures of the plankton, especially pteropods. often called by sailors whale food. They are allied to molluscs, but the *foot,* flattened out and wing-shaped, allows them to flutter through the water. They are sometimes called sea-butterflies. Pteropods in countless millions discolour the sea for miles, and form vast drifts familiar to whalemen as *brit.* Herman Melville in *Moby Dick* gives a vivid description of *brit* invaded by whales and likens it to a meadow.

Sperm whales live on squid, which occur abundantly in the Pacific Ocean. From observations made by naturalists we know that some squid attain enormous proportions (a length of 50 feet) and justify the big jaws and formidable teeth of sperm whales. The source of whale oil and spermaceti is "these pastures of the sea."

Milk is derived from the pastures of the land with the aid of cows; cod-liver oil from the pastures of the sea with the aid of fishes. Children may derive vitamin A from milk, and cod-liver oil. It is true, too true, that many cows in the British Isles supply with milk tubercle bacilli in countless millions. Most of us get a dose of bacilli and acquire immunity in adolescence. Observations in the deadhouse have established the frequency of obsolescent lymph-nodes, significant signs of the conquest of the bacilli by the defensive mechanism of the human body.

Clinical experience teaches that cod-liver oil is beneficial for tuberculous children. Cows like this oil especially in winter; it contains vitamin A. This substance exists in good cream and the proportion increases when the cow gets cod-liver oil. As a rule, children dislike cod-liver oil but eat cream eagerly. Now, it is becoming the fashion to give cows cod-liver oil and children cream, and they profit by a good supply of vitamin A.

The time may come when this variety of vitamin can be prepared synthetically and in a solid or crystalline form added to milk and coffee as easily as sugar! This is by no means an idle dream!

Faith in Physic

Much of the faith in physic is based on theory and superstition. The difficulty with which science has to contend is the slow rate at which its teachings percolate the mass of mankind. Even in the medical profession new truths take ten years to find their way into the text-books; but happily a great change has come over the attitude of medical men to disease. From being mere agents in the recognition and treatment of diseases they want to know the cause of

disease and how to prevent it. In this direction the research workers are earnestly and keenly engaged.

Faith in physic is expressed by the fortunes made from the preparation and cunning advertisement of simple remedies as cures for all sorts of diseases. Some notion of this faith is afforded by the Excise Receipts on patent medicines in Great Britain. In 1926, these receipts amounted to £1,290,000. There are men and women who swallow physic almost as regularly as they swallow food. They swallow physic on the maxim that a doubtful remedy is better than none. The proprietors of patent medicines could not flourish but for the fact that many diseases of mankind tend to get well spontaneously. In plain words, the majority of diseases get well in spite of such physic!

THE TOBACCO HABIT

THE NORMAN KERR MEMORIAL LECTURE*

Delivered Before the Society for the Study of Inebriety

BY PROFESSOR W. E. DIXON, M.D., F.R.S.

The Pharmacological Laboratory, Cambridge

The smoke emitted from any smouldering vegetable matter including tobacco contains ammonia and pyridine or one of its derivatives, and it is these two substances which cause the irritation of mucous surfaces observed in those who smoke. They are in every respect objectionable products, and add nothing to the pleasure of smoking. If they could be excluded from the smoke it would be all to the benefit of the smoked. Other dried herbs, such as coltsfoot leaves (at one time sold as boys' tobacco and harmless), often produce more of these irritants than properly prepared tobacco. The pyridine bases are oily volatile liquids intensely irritant, but compared with nicotine they have no toxicity. Another substance obtained from the slow combustion of vegetable matter is carbon monoxide, the poison of coal gas. In cities in which motor traffic is dense this carbon monoxide can be detected in the air of the streets, and not infrequently produces in the traffic policemen headache, nausea, muscular weakness, and rapid heart action. When the amount of this gas is determined in the smoke of cigars, cigarettes and pipes, the figures obtained are somewhat startling. Cigarette smoke yields from 0.5 to 1 per cent; the pipe 1 per cent or more; and the cigar 6 to 8 per cent. The latter amount, it is said, is roughly the proportion of carbon monoxide in the coal gas of the South Metropolitan Company. Tobacco smoke, however, reaches the mouth freely diluted with air, and the amount of this gas absorbed from the buccal cavity must be regarded as negligible.

The third, and by far the most important constituent of tobacco is the volatile alkaloid nicotine. The effects induced by smoking are practically entirely due to this principle. During smoking a part of the nicotine is burnt off and a part is inhaled with the smoke as free nicotine. The drier the tobacco the greater is the destruction of the nicotine. Moist tobacco evolves more nicotine and produces more serious effects than dry tobacco. It has been stated that the moistness of the tobacco is chiefly responsible for many of the evils of smoking. The moisture content of the tobacco must therefore be considered as more harmful to the smoker than the actual amount of nicotine. During the slow combustion of a cigar in ordinary smoking, there is an area immediately behind the point of combustion in which the active principles of the smoke condense; during aspiration the heated gases are drawn through this moist and cooler area carrying with them the volatile principles of which the nicotine is the most important. The cooler the smoke, and the more complete the combustion the less likely is the smoke to contain volatile toxic bodies. A cigarette or slender cigar, as it is cooler than a thick cigar, will yield fewer of the toxic products. Many smokers realize that a fat cigar has a more powerful effect than a long slender cigar of similar tobacco. This also explains the unpleasant effects of relighting a half finished cigar.

The amount of nicotine in tobacco is no criterion of the amount in its smoke. Mild honeydew contains only 1.6 per cent, while Cavendish may contain as much as 3.8 per cent. If these two are smoked under identical conditions the Cavendish will yield the larger amount of nicotine in the smoke, but Cavendish smoked in a cool pipe or in one provided with a filter will affect the smoker less than the honeydew smoked in a hot pipe. In smoking, the degree of moisture, the tightness of packing, the thickness of the cigar or cigarette, are the most important factors in determining the amount of nicotine which will be present in the smoke. It must not, however, be assumed that all the nicotine in the smoke is necessarily absorbed into the system. In the absence of expectoration the loss of any nicotine inhaled will occur through the exhaled smoke only; hence if a cigarette smoker were to puff ten cigarettes on end he would absorb quite enough of nicotine to produce a profound physiological effect. In pipe and cigar smoking the effect will be still higher.

* Abstract of address appearing in *Brit. M. J.*, Oct. 22, 1927.

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The other constituents of tobacco smoke are less important. Cyanides and sulphocyanides are present in traces. Arsenic is a constituent of American tobacco and exists in amounts many times greater than those permitted in foods.

Nicotine is by far the most important constituent of tobacco. It is one of the most fatal and lethal poisons known, and the nicotine present in one cigar if injected intravenously would represent two fatal doses to man. The careless use of tobacco infusions in enemata, the occasional swallowing of tobacco leaf, and even carrying tobacco leaves next to the skin for smuggling purposes have all led to fatal results.

If tobacco is heated to a temperature of over 100 degrees it gives off an empyreumatic oil once official in the *United States Pharmacopœia*. This oil is rich in nicotine and has an odour resembling a foul pipe and is very toxic. Various methods have been adopted to eliminate nicotine from the smoke and the oily fluid apt to form in pipe stems and bowls. Methods for removing nicotine from tobacco are now being investigated. Cigarettes and tobacco in various forms have been treated with superheated steam, but I have had no opportunity of investigating these products.

Tobacco used in any form possesses irritant properties. If five or six grains of tobacco are swallowed vomiting will ensue. Tobacco is also irritating to the skin, and its alkaloid is readily absorbed. I remember a child of eight years suffering from tinea capitis to whose head the expressed juice of tobacco was applied; the treatment was shortly followed by death. Excessive smoking will produce chronic irritation in the mouth, throat, and larynx, sore tongue, morning cough, tonsillitis, and chronic bronchitis. These effects are most marked in a cigarette inhaler. Smoking is reputed amongst the public to have an antiseptic action. Pepys describes the use of tobacco during the plague, and according to the Registrar General's report tobacco manufacturers have a lower death rate from cancer than those of any other trade.

Smoking is indulged in by man because of its sedative action which is due almost solely to a moderate absorption of the nicotine. Nicotine stimulates all nerve cells throughout the body without exerting any kind of selective action; this stimulation is followed by more or less depression. Morphine, heroin, and cocaine have a selective action on the central nervous system alone. Nicotine is different as it acts also on the autonomic nervous system. Among the commonest results of smoking are loss of appetite and chronic intestinal catarrh. Nevertheless tobacco smoking by stimulating the autonomic ganglia increases the secretion of the alimentary glands. It is well recognized that in certain persons excessive smoking leads to gastric hypersecretion, and hyperacidity is one of the more common results of excessive tobacco smoking. The excessive use of tobacco in any form invariably produces certain definite effects on the circulation. It increases the pulse rate from 5 to 10 beats a minute, an increase which under persistent use becomes permanent. During the war it was generally asserted that the excessive use of cigarettes was the common cause of the so-called D.A.H. (disordered action of the heart). Not only does it produce an increase in the pulse rate, but tobacco smoking induces a slight, but definite rise in blood pressure, and it is only in the case of the novice, or after excessive smoking, that blood pressure falls to any extent below normal after the smoking has ceased.

Although the changes from the normal just mentioned are after all usually slight and may give rise to no symptoms, the evidence available suggests that they cannot be regarded with indifference. When training for athletic events, it is a maxim that smoking must be entirely eschewed. It would appear that even in the case of a moderate smoker, the heart becomes less efficient in periods of strain.

The more definite effects which occasionally induce patients to seek medical advice, are palpitation and arhythmia. The arhythmia is functional and is usually due to extra auricular systoles. It may occur at any age, but according to Rolleston is more noticeable after fifty. A more important symptom which may arise from excessive smoking is anginoid pain which rarely approximates to true angina. Arteriosclerosis is easily produced in animals, but I do not think it is a common effect in man. In severe cases, the cardiac irregularities may lead to syncope, and an undue proportion of sudden deaths are said to occur in heavy smokers. While it must be conceded that ordinary smoking in normal people does not lead to nervous disturbance, excessive smoking is another matter and may produce anxiety and insomnia. Amblyopia arising from excessive use of tobacco was first noticed by Mackenzie in 1835, and accurately described by Hutchison in 1864. The sight gradually becomes dim owing to a central scotoma. The condition is associated with retrobulbar optic neuritis. If smoking is stopped before degeneration has set in recovery may take place. When degeneration once sets in abstaining from nicotine will only arrest further progress.

Few things are more difficult to analyze than the reasons why smoking gives rise to a feeling of content, satisfaction or even positive pleasure. The element of rhythm plays its part. Sight and smell would appear to be other important factors; the cloud of white smoke rising before

the smoker is soothing and companionable. The amount of nicotine in the smoke is certainly not the determining factor in the pleasure; the aroma is more important. During the last fifteen years an enormous increase has taken place in the amount of tobacco smoked and especially in the form of cigarettes and it is difficult to avoid the view that its prolonged and excessive use must have a deleterious effect.

BLUEBERRY LEAF EXTRACT*

By Frederick M. Allen, M.D.

Morristown, N.J.

In 1925 Professor Durig of the University of Vienna became impressed with the benefits of blueberry leaf as used in the form of a tea for diabetics among the Alpine peasantry, and directed that an investigation of its properties be made in his laboratory. As a result of these investigations it was shown that an infusion of the blueberry leaf had a distinct but variable influence on the alimentary hyperglycæmia of dogs. Later on Dr. Wagner, the chemist who carried out this investigation, was able to demonstrate the presence of two antagonistic ingredients in the leaves, one tending to raise and the other to lower the amount of sugar in the blood. The latter substance was first investigated and partially purified and was given the name of "myrtillin" from the myrtle family of plants, in a number of which it was found to be present. In further experiments this new principle was found to reduce alimentary glycosuria and prolong life in depancreatized dogs, and to reduce or abolish glycosuria in diabetic patients. Papers upon it have been presented at several of the American societies during the past year.

Myrtillin occurs in almost all green plants. Plants of the myrtle family, and especially the leaves of the blueberry, have an advantage in the relative abundance of the ingredient and its ease of separation. Myrtillin as obtained from blueberry leaves (*vaccinium myrtillus,* and *vaccinium pennsylvanicum*) by a comparatively simple process is a greyish or brownish amorphous substance which has not yet been obtained in a chemically pure state. In water or dilute alcohol, it forms a slightly turbid colloid solution. Acids favour its solution. Alkalies cause its gelatinous precipitation. It is insoluble in pure alcohol, and has a rather high resistance to heat. It would appear to be a plausible assumption that these two ingredients found in the leaves of so many species of plants represent opposed factors in the carbohydrate metabolism of plants; myrtillin being the anabolic factor, and the other principle, referred to above as the sugar raising principle, the catabolic factor. Myrtillin is entirely different both chemically and physiologically from insulin. Even the largest doses are apparently non-toxic. It may possibly rank among the vitamines, and appears to be equally effective when administered intravenously or orally. It does not appreciably change the normal fasting blood-sugar content, and never causes hypoglycæmia. Its characteristic effect is a reduction or complete suppression of the hyperglycæmia following the administration of large quantities of dextrose to dogs or human beings. The effect is not a mere alteration of the absorption capacity for it is obtained when the myrtillin is given orally and the dextrose intravenously or vice versa. Myrtillin appears to be able to be stored in the body, for its effects can be demonstrated in gradually decreasing degrees for some time after a single dose only has been administered.

Totally depancreatized dogs seldom survive more than a few days. The extreme cachexia and diabetes produced by this operation are well known. If severe symptoms fail to appear and the animal survives several weeks, there is always reason to believe that the operation was incomplete or that accessory pancreatic tissue was present. Myrtillin however administered soon after the operation, not only lengthens the duration of life, but instead of rapid cachexia setting in the animal continues to appear strong and lively for several weeks, glycogen remains abundant in the liver, and the body weight after an initial fall is well maintained until a few days before death. Sugar then appears rapidly in the blood and urine, and wasting takes place immediately. Insulin will still save the animal if administered in time.

When such a small remnant of the pancreas as one-fiftieth of the organ is allowed to remain, myrtillin appears even still more successful, and dogs have been kept under its administration in good condition for an indefinite period without any artificial aids to digestion, with urine free from sugar, and the blood sugar content never above normal. Without the employment of myrtillin such an operation would have proved just as surely fatal as if the total organ had been removed. The administration of myrtillin effects apparently an actual cure. Experiments to date would indicate that myrtillin also tends to stabilize the blood sugar which

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* Abstract of paper read before section on Pathology and Physiology, 78th annual session, American Medical Association. *J. Am. M. Ass.*, Nov. 5, 1927, p. 1577.

Klin. Wochenschrift, Aug. 27, 1925, iv, 1692-3. *Ibid.*, iv, 1870-1; also papers read before the Federation of the American Society for Experimental Biology—and an outline of observations presented to the Association of American Physicians.

XUM

otherwise is apt to fluctuate widely, and that it spares insulin. In the cured cases the pancreas remnant has been found greatly hypertrophied up to ten times its original size, but as hypertrophy has sometimes been obtained without the use of myrtillin it cannot yet be stated with lertainty that such regeneration is entirely due to the myrtillin.

Dr. Allen in his paper reports on 81 cases of diabetes in the human treated with myrtillin. In these patients the effects did not seem to be as prompt nor as powerful as in dogs. A week or possibly longer may be required before the full action of the myrtillin is manifest. The gradual beginning and the gradual wearing off of the effects of myrtillin tend to make accurate studies difficult. Allen found it inadvisable to give myrtillin to patients with unchecked glycosuria. The slow and mild action of the myrtillin in these active cases often proved ineffectual. It is better to use diet restriction, and if necessary insulin to stop the glycosuria and bring the blood sugar to normal, and then begin with myrtillin and look for results in a gradual rise of tolerance and a gradual diminution or disappearance of the need for insulin. The empiric dose of myrtillin is one gramme a day. If the dose be much smaller than this amount, the noticeable effects are slight. On the other hand little increased action is secured from larger doses, but even the largest doses are non-toxic.

Myrtillin never causes hypoglycæmia. Its stabilizing influence appeared in many of the patients, and its employment would appear to be especially valuable in patients subject to troublesome hypoglycæmic attacks. In several children myrtillin reduced such attacks in number and severity or prevented them completely.

In some cases for reasons not yet discovered myrtillin appears to fail in the above effects. It is uncertain what period of trial is proper before accepting failure. In one child with particularly severe diabetes the usual two months' period did not bring a reduction of insulin, but its continuance was requested because of the nearly complete freedom from previous hypoglycæmic attacks. After a year, it had become possible to reduce the insulin from 50 to 30 units. In general, the best results are obtained in the milder cases and in middle aged or elderly patients. Children react poorly. There is, however, no infallible clinical rule. The benefit of myrtillin when obtained is indefinite in duration. When myrtillin is omitted accidentally or intentionally for a few doses or even a few days no important change is noted. The continuance of the effect for from one to several weeks can only be explained by some storage in the body.

In closing a discussion which followed the reading of this paper Dr. Allen said, to propose a new remedy for diabetes is one of the riskiest things a person can do. The results obtained in animals seem to be beyond question and other laboratories have confirmed my findings.

In an Editorial Comment the *Journal of the American Medical Association* refers to the fact that the Council on Pharmacy and Chemistry advise caution. On the basis of the evidence laid before it the Council points out that while the drug has possible usefulness, the actual value of it in the treatment of diabetes in man has not yet been proved, and that such proof must come from workers, who have the necessary clinical opportunities, and laboratory facilities on which to base judgment. Nevertheless the above report of the action of this drug coming from an investigator, who has contributed so much to our knowledge of diabetes deserves careful consideration and investigation. (ED.)

THE STORY OF CIRCUMCISION*

BY GEO. R. PIRIE, M.B., M.R.C.P.

Toronto

It is probable that circumcision has been thought of by the majority of people, as it was by myself, to have been a religious rite peculiar only to the Hebrews. This is not so, but the great antiquity of the practice has obscured its real origin and object.

Strictly speaking, the term "circumcision" is applied to a nationally wide-spread operation for the ablation of the male prepuce, though a looser application of the term has been made to include simple incision of the prepuce, and two operations upon the female genitals—clitoridectomy and ablation of the labia minora. Female circumcision has been comparatively rarely performed and will not be described.

The operation upon males is a very common one, not only among primitive, but also among highly civilized peoples. Its use, however, as a therapeutic measure is a very modern one, and is not a satisfactory explanation of its ultimate origin.

A great deal has been written as to the antiquity of the practice, but in it all there is very little conclusive evidence and much speculation. It is a curious fact that few peoples practising this rite have any legend or theory as to its origin; they do it because their fathers before them did it. The sources of information are so meagre that it is not to be wondered at that many divergent opinions are held as to its origin. The Old Testament, Egyptian monuments, and the writings of early historians, undoubtedly influenced by the traditions and superstitions of the people among whom they

* Read before the Canadian Society for the Study of Diseases of Children at the annual meeting, Toronto June, 1927.

lived, are our only sources of information on the subject.

The Hebrews for nearly 4,000 years have claimed that it was a divine institution in the beginning, and that the Chaldeans, Phœnicians, Egyptians and others copied the practice from them.

It is claimed by the Egyptians that circumcision was an evolution of the phallic worship instituted by Isis after the tragic end of her husband, Osiris. The earliest direct evidence of Egyptian circumcision consists in the discovery at Saqqarah of an authentic representation of the operation dating from the VIth dynasty. In it, the child is standing before the operator, his hands securely held in front of his eyes by a man behind him. The operator says, "Hold him that he may not faint away," and the assistant replied, "Do your best." The operator then kneeling in front of the boy does his best with a small, oval-shaped blade, probably made from stone or flint.

One of the chief arguments of the Hebrews that theirs was an independent custom is that they circumcised at eight days while the Egyptian rite was performed at puberty. However, the first Jew to be circumcised, Ishmael, the son of Abraham, was operated upon at the age of thirteen. It was at a great deal later period that they began to practice the rite in infancy.

While there is no way of knowing how natives in the western world of Africa, Australia, and America began the practice, it is probable that they copied it from Europe and Asia.

There is some evidence that in very early times there was a land connection between the two hemispheres. Other circumstances, besides circumcision, would indicate that there must have been some means of intercourse. For example, central America has cities bearing the same names as cities in Armenia; pyramids exist in central America as well as in Egypt, and there is a marked resemblance between the architecture of the Phœnicians and that of the Incas and Aztecs. Thus it is probable that the early peoples in the western world copied the rite of circumcision from what we call the old world.

Attempts have been made by studying the etymology of the word used for circumcision among various peoples to learn its meaning and import.

Among the early Arabs, the word seemed to bear relation to other words refering to the preparation for the marital state. Among the later Arabs and Hebrews, corresponding words meant "to purify". This probably accounts for the later religious application of the rite.

The most rudimentary form of circumcision is a simple gash in the prepuce. In Tonga and among certain African tribes, it is torn with the fingers, with a mussel shell, or a splinter of bamboo. The Marolongs of South Africa formerly used a fire stone, that is, a meteorite, but now use an assegai. Other tribes, such as the Somali and Kikuyu, make a single cut through the dorsum of the prepuce and extend it into the glans. The Tartars excise a wedge-shaped piece from the prepuce.

Certain Arab tribes not only ablate the prepuce, but also make an incision in the skin on the dorsum of the penis throughout its whole length and also remove a piece of skin from the abdomen. Jewish circumcision showed a noteworthy deviation. In early days, they simply removed a portion of the prepuce. Some of the tribes of Israel, not wishing to appear different from the uncircumcised neighbours, performed such a plastic operation upon what was left of the prepuce as to make it appear longer and thus covered the fact of the circumcision. It thus became imperative that the mucous membrane should be split and stripped from the glans so it should lie bare. According to this regulation, if any fringes of the foreskin remain, the operation is inefficacious. In central Australia the operation was originally performed with a fire stick, but owing to the high mortality, probably from septicæmia, a stone knife was substituted. Some of the Hindus use a wooden knife in the mock ceremony which represents the ritual survival of Mahommedan circumcision. And to-day, in our own country, there would seem to be just as wide variation in the kind of operation, as in the choice of instruments used to perform it.

The ablated prepuce was disposed of in many and curious ways. The tribe of Levi, who alone kept up the practice during the exodus, piled up the foreskins in the wilderness and covered them with earth. The East Africans buried it in the ground in front of the boy just circumcised. In West Africa it is soaked in brandy and swallowed by the victim. In Madagascar it was formerly wrapped in a banana skin and fed to a calf; now it is loaded into a gun and fired into the sky.

The Australian tribes have also some curious customs as to its disposal. In some parts it is buried beside a pond to make the water lilies grow. In other instances, it is swallowed by a younger brother to make him tall and strong. During one year of the great war, I used to save the ablated prepuces from my hospital for the women who staffed the Endel St. Military Hospital. They used them as skin grafts.

A few of the theories that have been suggested as the reason for its origin are:—

1.Hygienic.—This is a very old explanation, and is given by Herodotus as the one used for the practice of the rite among the Egyptians.

However, the lack of hygienic concepts among primitive peoples renders this explanation as a general one highly improbable. The only modern people giving this as a specific reason as the Samoan. In hot countries, the penis is peculiarly liable to disease from the retention of smegma behind the glans. Therefore "to cut around" and "to purify" may have had reference to hygienic considerations originally, and then have become a religious observance. Its acceptance by the popular mind now is probably due to modern surgical and therapeutic reasons for its performance.

2. Several reasons exist for considering the theory that it was a preparation for the marital state, a probable one. For example, two Arabian words having the same root mean in one instance "to circumcise," and in the other "to become akin to someone through his wife." Then again the widespread practice of the operation at or before the age of puberty is significant. The African tribes, Central and South Americans, Mexicans, Egyptians, Hindus, Turks and Mahommedans, all performed the rite at ages varying from two to twelve; only an isolated tribe in east Africa performs it as late as the 17th year. The sole exception is among the Hebrews who circumcise and name their boys on the 8th day. But even with them there is some evidence that the rite was at one time performed much later and had some relation to the preparation for marriage. For example, in Genesis 34, is chronicled the refusal of Jacob to allow his daughter, Dinah, to wed Shechem the Hittite, until he had been circumcised. And again in Exodus 4 is related the fact that even the son of Moses was not circumcised until he was quite a lad. And again, in Joshua 5, is the story of how all the young men born in the wilderness were circumcised. The operations were performed at Gilgal and marked the removal of the Egyptian reproach from the people of Israel. From this circumstance also has been argued the priority of the Egyptian practice of the rite.

3. It is a test of endurance among some tribes. This is especially so in Arabia and Africa. Among certain of the former, the subject being operated on is required to hold in his hand a lance with the butt resting upon his foot. He must not show the slightest expression of pain or the least quiver of the lance. On the Loango coast, at the least expression of pain on the part of the victim, his intended bride who is present at the ceremony, breaks the engagement.

All this, however, does not make circumcision an endurance test *par excellence*. It was simply one of the trials the young man had to undergo before entering upon man's estate, when he would be permitted to bear arms and sit in council.

That it was a form of sacrifice seems to explain the practice among the Americans, especially the Mexicans. Very early, the man himself was offered as a sacrifice. Later on, simply part of him or the spilling of his blood was acceptable. And still later on, as has been mentioned, are found some who perform a mock ceremony of circumcision with a wooden knife. If the rite was an evolution of phallic worship in Egypt, the sacrificial character of the ceremony is evident. Occasionally also, among the Hebrews, the practice would appear to have had this significance. The circumcision of Gershon, the son of Moses, referred to in Exodus 4, seems to have been performed with the hope of ransoming his father from the wrath of Jehovah; although another interpretation of this incident is the influence of Moses' Midianitish wife, among whose people the boys were circumcised about puberty.

In by far the great majority of cases, circumcision appears to be initiatory in character. Whether it is a preparation for the married state, an effort to avert sexual peril, a test of endurance, or a tribal mark, all these factors are necessary for the complete life of manhood. Thus the rite naturally would be performed about puberty. The realization among some of the natives that the operation became more painful and more dangerous the longer it was delayed resulted in the gradual lowering of the age at which it was performed.

Among the ancient Egyptians and Aztecs it was a mark of social distinction, in that only the ritual priests and leaders were circumcised. As opposed to this, there are a few African tribes where the leaders only escape the mutilation. Apparently there is no one reason which will satisfactorily explain the circumcision in all instances. Even the plea that it was hygienic cannot explain the practice among primitive peoples. Crawley, in "The Mystic Rose," claims that, to the primitive mind all matters connected with the reproductive functions are essentially connected with religion, and all rites of initiation are primarily religious. In summing up all the evidence available, James Hastings concludes that circumcision in its inception and late into its development was fundamentally religious and connected with sacrifice.

Correspondence

Our Edinburgh Letter

(From our own correspondent)

The medical profession has sustained a serious loss by the death of Professor Henry Harvey Littlejohn. Professor Littlejohn succeeded his famous father in the Chair of Forensic Medicine twenty-one years ago. He was appointed at the same time to the post of Chief Police Surgeon in Edinburgh. This brought him in close touch with the Criminal Authorities and he frequently appeared as a witness for the Crown in cases before the High Court. As a lecturer his gift of clear exposition and lucid reasoning made him pre-eminent. He was Dean of the Faculty of Medicine for many years. Professor Littlejohn, like his father before him, was acknowledged to be one of the greatest experts in Medical Jurisprudence. With his forensic gifts he was a most dangerous man to cross-examine if he chose to be, but he enjoyed the reputation in the Scottish Law Courts of always being moderate, just and fair.

The threatened demolition of David Livingstone's early home at Blantyre has been averted, and a generous response has greeted the appeal for funds. The property, situated in beautiful surroundings on the banks of the Clyde, and covering some nine acres of ground, has been purchased. Livingstone's house and the adjoining Shuttle Row will be preserved externally as they stand. The famous narrow room where the great explorer was born will be restored as it was in 1813, while within the buildings there will be housed an exhibit to recall Livingstone's vivid personality and to illustrate his amazing achievements.

In the days when a Scottish King reigned at Holyrood, and until much later, one of the most salubrious residential quarters in Edinburgh was the Cowgate. There the great Cardinal Beaton was not too proud to have his city residence, within easy reach of the Palace. Gradually, with the passage of years, this part of the city fell into disrepute, until latterly, for many decades, what was once a pleasant district of gardens and shrubberies became one of the worst slums in the city. That state of affairs, however, has not been allowed to last and for some years many of the more dilapidated houses have been pulled down, letting in much needed light and air. This week a Cowgate health week has been organized. A series of attractive demonstrations and lectures have been prepared and one of the halls of the Cowgate Dispensary has been used to house a number of exhibits. These deal with a wide range of subjects and have been carefully arranged with a view to making a wide appeal to the lay mind. Colonies of tubercle germs have been imprisoned in glass receptacles, and there one may see the disease captured by the scientist from somebody's milk.

In a section devoted to household ventilation, disinfecting, etc., a model of a ventilated room is shown, and instruments for disinfecting purposes demonstrated. The subject of food values is made both interesting and amusing by practical models and displays of food, with simple and straightforward explanations. A dental section contains models of teeth of all sorts, including those mis-shapen by breathing through the mouth instead of the nose, and by sucking the thumb in infancy. Maternity and home nursing are amongst the other subjects dealt with. The interest in the exhibition is doubled by the presence of doctors and students, who accompany the visitors round as far as possible, and still further explain things. Continuous demonstrations are also given in several of the sections.

The Scottish Board of Health has recently issued a circular regarding the notification of Puerperal Fever. Attention has been called to the necessity of making arrangements for treatment under the best possible hospital conditions. Adequate safeguards against infection from other diseases are considered essential, as are the services of a Specialist and a Resident Medical Officer. Medical Officers of Health should report any instance of failure or delay in notification to the local authority, which will consider whether the facts should be brought to the notice of the Procurator Fiscal (Coroner.)

On July 22nd, Sir H. Arthur Rose, Chairman of the General Board of Control for Scotland, placed a laurel wreath on the bust of Philippe Pinel. This bust is built into the archway of the Royal Edinburgh Mental Hospital at Morningside and is the only portrait of its kind to the illustrious French Physician in Scotland. Dr. H. Colin of Paris said that, while the statue to his memory in Paris had only been erected in 1885, the bust at the Royal Edinburgh Mental Hospital had been placed in its present position as early as 1838. Pinel's fame rests mainly upon the fact that during his tenure of office as head physician of the Bicêtre in Paris he was among the first to introduce the humane treatment of the insane. An interesting link which connects Pinel with Scotland is the fact that his first publication was a French translation of William Cullen's Nosology, (1785).

Two Academic Chairs are vacant in Edinburgh at present; the Chair of Systematic Medicine, due to the resignation of Professor G. Lovell Gulland, and the Chair of Forensic Medicine, owing to the recent death of Professor Harvey

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Littlejohn. Professor Gulland has been re-appointed for six months and will remain in office during the forthcoming winter session No appointment has yet been made to the Chair of Forensic Medicine, which is a Crown nomination.

A new psychopathic hospital is to be opened in connection with the Royal Hospital at Morningside. While there is an outpatient clinique in connection with the Royal Infirmary, patients who are suffering from mental troubles are not admitted to the wards of that general hospital. By sending patients to the psychopathic hospital in the early stages of mental disease, it is hoped to hasten their cure and to obviate the necessity of certification. The hospital will be ready to receive in-patients about the end of the year and there will be accommodation for about fifty persons. An outpatient department has also been designed in connection with it.

During the past year, three notable war memorials have been opened in the city of Edinburgh.

In connection with Leith General Hospital, a new wing has been erected for the treatment of children. This idea of commemorating their fallen townsfolk by providing appropriate accommodation for sick children appears a very happy one. The new wing is a handsome two-storied building containing thirty-six cots, and along with the equipment and the necessary extensions for the nurses' home has cost about £40,000. The dedication ceremony recalls the fact that out of a population of 84,000, no fewer than 14,000 enlisted, while the roll of honour contains the names of 2,205 officers and men who lost their lives in the war.

Another reminder of the days of 1914-1918 is the Scottish-American War Memorial, which was unveiled on Wednesday, 8th September, by Dr. Houghton, the American Ambassador. The memorial was designed by R. Tait Mackenzie, M.D., LL.D., of the University of Pennsylvania and is the gift of Scots in the United States. It is situated in West Princes Street Gardens. The bronze figure of a young Scottish soldier looks upwards to the ancient castle above, a rifle rests across his knees, and he is in the act of rising in response to some distant summons to which he listens attentively. A spirited parade of figures in the background depicts a pipe-band on the march summoning an eager following of shepherds, fishermen, and miners. The memorial is entitled "The Call," and is a dignified rendering in stone and bronze of the stirring days in 1914, which will not be viewed without emotion. Situated within a few feet of Edinburgh's world-famed thoroughfare, the memorial has the advantage of one of the best sites in the city.

The highest point of the Edinburgh Castle rock has been crowned by the Scottish National War Memorial. This shrine was opened last July by His Royal Highness, the Prince of Wales. The building occupies nearly the same site as the Chapel of St. Mary, founded by David the First, rebuilt by David the Second, and afterwards demolished to make way for barracks. The memorial has been designed by Sir Robert Lorimer, and Scots from every country of the world have contributed to this casket of memories. The approach to the memorial is across the old parade ground, over the draw bridge, and through the archway where hung formerly the portcullis. This old parade ground—curiously called "The Esplanade"—is Canadian soil. It was declared by royal mandate of Charles the First part of the soil of Nova Scotia, in order that the Royal Martyr might confer Nova Scotia baronetcies without pursuing the Mayflower across the stormy seas of the north Atlantic. As we wind round the paved causeway, Edinburgh lies like a map at our feet, the salt water and the highland hills are seen in the distance. On the outside of the Memorial are panels reproducing the old divisional signs, so familiar in the various war zones, 51st (Highland), 52nd (Lowland), and the others. Entering the porch, the great hall of honour stretches to right and left while in front of us is the soaring arch which gives access to the shrine. In the centre of the shrine is the casket where lie written the names of the hundred thousand Scotsmen who were faithful unto death. This casket which is a notable example of smith work, is the gift of Their Majesties the King and Queen. A bronze frieze, representing the various types of Scottish soldiers and sailors who fought on the world-wide battle fronts, on the sea, and in the air, surrounds the shrine. The purpose has been not to show them in parade order, but, in the battle kit and working dress in which they lived and fought and died. In the Hall of Honour, the walls are divided into pillared arcades. In each arch is the memorial of a regiment, with its numerous battalions. Here are also commemorated the Women's Services, the Mercantile Marine, the Padres, Royal Engineers, Royal Artillery, Yeomanry, R.A.M.C., R.A.S.C.. The whole Memorial is a thing of matchless beauty and the sanctuary as it stands to-day is a lasting and worthy tribute to the memory of Scotland's Hundred Thousand Dead.

GEORGE GIBSON.

Our London Letter

(From our own correspondent)

The Beginning of the Year.—The opening of the Winter Session in the various medical schools marks the beginning of the academic year and once again we have had a number of extremely able addresses from leaders of the profession. Perhaps of them all, Sir Humphry Rolleston's talk on "The Meaning and Methods of Success" was the most valuable, for it must often puzzle students at the beginning of the year as to what they want to do in the medical profession and just why they want to do it. There is so much difference between the purely financial outlook and the purely humanitarian one that it is obvious that the vast majority of us must fall between

the two, and Sir Humphry has succeeded in sketching out aims for the common man and the methods he must pursue to attain these aims. This year the beginning of the session is particularly noteworthy, for at last the prospect of a real University of London building is in sight, and not obscured by mists of futile bickering. There have been few changes during the year in the personnel of the several medical faculties but a noteworthy addition to London is the appointment of Prof. E. H. Kettle to the chair of Pathology at St. Bartholomew's Hospital. Unfortunately Prof. Kettle was taken seriously ill before he left Cardiff. The last reports, however, state that he is on his way to recovery.

Hospital Policy.—By discussions and correspondence in the medical and lay press we continue to try to find out what is wrong with our present hospital policy, and what is to be done about it. It has been said that the ideal method of obtaining any reform is to get a great majority of people united as to the next step. This stage has not yet been reached, but progress is certainly being made. The proposals by Mr. Hey Groves for a state hospital service have already been mentioned in these letters and at the recent meeting of the British Medical Association at Edinburgh a very valuable discussion was opened by Mr. Herbert Eason, senior ophthalmic surgeon and superintendent of Guy's Hospital, on the relation of municipalities to voluntary hospitals. In this address he analysed the present position of the "infirmary"—the poor law institution where within recent years the standard of medical service has so strikingly improved. He concludes that these municipal hospitals with their large number of beds should be under joint management with voluntary hospitals as regards most of their affairs, including the provision of the medical staff. He urges that the voluntary hospitals should have a predominant share in this partnership, subject to the approval of the municipal authorities. There are many difficulties ahead in any such scheme and indeed in these days many are asking—What is a voluntary hospital?—Does one really exist that is purely supported by voluntary subscriptions?—Is it possible that the voluntary system can survive? How has it survived the past twenty-five years of rapid development in medical science, and the financial upheavals of more recent times? The answer to many such questions is to be found in "King Edward's Hospital Fund for London" which celebrated its thirtieth anniversary by a luncheon at the Mansion House the other day. The King's Fund came into being to appeal collectively for the London hospitals which were hampered financially by their individualism, which is so valuable an asset in other ways. In the darkest days of the post-war period, when the future of the voluntary system was under very severe strain, Lord Cave's Committee, determining that the system could be saved, called upon the King's Fund to act as the "G.H.Q." for the reorganization of hospital finance; and it is not too much to say that it was this move which was largely instrumental in saving the voluntary system. What of the future? Mr. Hey Groves seems to have suggested that it was not worth while saving a corpse. Others, however, believe that it has a great future before it. In time, no doubt, the majority will be united on the next step in reform but we must beware lest we wait too long.

Anti-rheumatic Fever Campaign.—The west of England has recently given an example to the rest of the country by the inauguration of a campaign to deal with cardiac disorders due to rheumatism. A meeting was held in Bristol early in October, attended by the school medical officers of four counties and consulting physicians within the same area. The objects of the scheme are principally concerned with research into the conditions under which children contract rheumatic heart disease, and the best method to render effective assistance in the treatment of such cases. The first step would appear to be to secure the generalization of a plan which has been in operation in Bristol for some years. The local authorities are to make arrangements whereby children, thought by the school medical officer to require it, may receive examination by physicians with special experience in the disease. The districts covered vary considerably as to soil, altitude, and social conditions, so that much valuable information should be forthcoming. The scheme has the support of the Board of Education, and has been initiated at the suggestion of the sub-committee of the Science Committee of the British Medical Association. Its focus is the University of Bristol Centre for Cardiac Research, sustained by various grants, and the plan also includes the provision of a number of beds in a county hospital near by for the treatment of cardiac rheumatism in children.

ALAN MONCRIEFF

London, November 1927.

Association Notes

THE STUDY COMMITTEE ON NURSING OF THE CANADIAN MEDICAL ASSOCIATION AND THE CANADIAN NURSES' ASSOCIATION

The nursing problem was the subject of a conference held in Toronto in June last. Representatives were present from the Canadian Nurses' Association, the Canadian Medical Association, and the Provincial Hospitals' Association. Resolutions were passed requesting that a Study Committee be formed, consisting of three representatives from the Canadian Nurses' Association and the Canadian Medical Association respectively, and one, who must be a layman, from the Provincial Hospitals' Association of the province in which the committee will most regularly meet; and further, at the request of the nurses, that the expenses of this committee for the present be borne equally by the Canadian Nurses' Association and the Canadian Medical Association. These resolutions were forwarded to the bodies interested, with the result that a committee of seven was formed under the chairmanship of Dr. G. Stewart Cameron, Peterborough, who, with Dr. A. T. Bazin, Montreal, and Prof. Duncan Graham of Toronto University, will represent the medical profession. Miss Jean Gunn, Toronto General Hospital, Miss K. Russell, Director of the Department of Public Health Nursing, Toronto University, and Miss Jean Browne, of the Canadian Red Cross, will represent the nurses. The seventh member has not yet been appointed. In explanation it may be said that, as the Committee has to meet frequently, it was thought advisable to choose the personnel as far as possible from one locality. The general activities of the committee will in time spread to all parts of Canada. The Canadian Medical Association authorized the expenditure of not more than $300.00 for the current year, and the Canadian Nurses' Association will it is understood, authorize the expenditure of a similar amount.

Two meetings thus far have been held. After a general survey of the situation at the first meeting it was decided that the nursing members should form a sub-committee to draft a general statement of the several points to be considered in the study. This report—published in full below—was submitted to the full committee on October 8, 1927, and after long and careful consideration it was resolved that the report should form the general basis for study.

In publishing this note, it is the desire of the committee that the medical and nursing professions should be fully apprized of the progress of this work, and that they endeavour to familiarize themselves with the facts underlying the many questions that are more or less controversial at present.

Report of the Sub-Committee of the Study Committee on Nursing of the Canadian Medical Association and the Canadian Nurses' Association

This report of the sub-committee is not a plan of study, but rather a suggested outline of the scope of various studies that will be needed before final conclusions can be reached. It is not claimed that this is a complete statement, but it is hoped that it may serve as a basis of discussion for the whole committee.

I. The Demand

Studies to be made in selected communities concerning the kinds of nursing service wanted, the essential content of each kind, and the number needed in each of the following classifications:—

1. Hospital nurses—graduates.
2. Hospital nurses—undergraduates (students).
3. Private duty nurses.
4. Practical nurses.
5. Public health nurses.
6. Any others.

II. The Supply

The number of each of the following now on active service.

1. Hospital nurses—graduate.
2. Hospital nurses—in training.
3. Private duty nurses.
4. Practical nurses.
5. Public health nurses.
6. Any others.

The geographic distribution of present service in each group by exact figures and maps.

Comparative studies of demand and supply.

III. Nursing and the Public

1. The kind or kinds of nursing service required.
2. The extent to which the present types of nurses are meeting the needs of the family.
3. What change in the character of the nursing service, if any, is sought by the family.
4. A study of the economic resources of the average family for nursing service.
5. A study of the community responsibility for the care of the sick.
6. Relationship between this service and other community services for which the cost is shared.

IV. Hospital Needs re Nursing

Study of a selected group of

1. General hospitals—large.
   medium.
   small.
   very small.
2. Special hospitals—large.
   medium.
   small.
   very small.

in regard to,—

Number of nurses and other personnel employed.

Number of nurses and other personnel needed.

The present demands on the nurse for service

other than bedside nursing in each of the above types of hospitals.
The essential content of the nurses' work in hospital bedside nursing.
Strength of the present service or tendencies.
Weakness of the present service or tendencies.
The hospital private patient and nursing care.
Study of possibilities to relieve the nursing personnel of non-nursing duties.
Study of the relation between the time spent by the pupil nurses in the class room and the lack of nursing care in the wards.

V. Private Duty Nurses and the Medical Profession
Studies made in consultation with the medical profession concerning,—
1. Source of supply of nurses, *e.g.*, professional registry, hospital registry, commercial registry, and others.
2. Proportion of nurses satisfying needs of the case from the standpoint of the medical profession.
3. Proportion of nurses not satisfying the needs of the case from the standpoint of the medical profession.
4. Further studies of the causes of dissatisfaction.
5. Study of the demand for practical nurses.

VI. The Nurse
1. The inducements of the profession.
2. The satisfactions of nursing.
3. The economic aspects.
Average length of service.
Average income in each branch.
Average living expenses in each branch.
Range of income in each branch.
Length of service in relationship to income.
Disabilities.
Financial opportunities, such as insurance, etc.
Cost and opportunity of post-graduate training.
4. Hours of duty.
5. Study of,—
Loss of nurses from the profession.
Turn-over within the profession.
Extent of and reasons for emigration to the U.S.A.

VII. Nursing Education
1. Hospital schools:
Number of schools in general hospitals with number of pupils.
Number of schools in special hospitals, with number of pupils.
Cost of the training school to the hospital.
Evaluation of the work of the student nurse to the hospital.
Comparative cost of nursing service in hospitals not conducting training schools.
Length of course.
Hours on duty.
2. Preliminary education required in various types of schools.
3. Study of the curriculum from the standpoint of both theory and practice.
4. Study of the qualifications of the present teaching personnel.
5. Post-graduate opportunities
(a) in hospitals.
(b) in universities.

VIII. Study of the Professional Registration Acts in Canada.

G. STEWART CAMERON,
Chairman.

THE FIFTY-NINTH ANNUAL MEETING

Plans for the fifty-ninth annual meeting of the Canadian Medical Association, to be held in Charlottetown, P.E.I., during the week of June 18th, 1928, were thoroughly discussed during a two days' conference held in Charlottetown on Wednesday and Thursday, November 9th and 10th. In addition to the local members, the following visitors were present: Dr. F. N. G. Starr, Toronto, President of the Association; Dr. A. T. Bazin, Montreal, Honorary Treasurer and Managing Editor; Dr. John R. Nugent, Saint John, Secretary of the New Brunswick Medical Society; Dr. S. L. Walker, Halifax, Associate Secretary of the Nova Scotia Medical Society, and Dr. T. C. Routley, General Secretary of the Canadian Medical Association.

The Prince of Wales College, situated in the heart of the city, has been secured as the place of meeting. This building affords splendid accommodation for our requirements. No uneasiness need be felt regarding the hotel accommodation, as the local hotels will be able to take care of the registration. Furthermore, the steamer *Northland* will provide splendid hotel accommodation for the 150 people who will travel by the steamer from Montreal.

The play hours of the convention have been adequately provided for, the hospitality of the entire island being placed at the disposal of the visitors.

Prince Edward Island stands ready to extend a most hearty and cordial welcome to our members and their friends. Your officers who attended the November conference are assured that the fifty-ninth annual meeting is going to be one of the most successful in the history of the association.

THE ANNUAL FEE

Early in the New Year, members will be called upon to pay the annual fee for the year 1928. If every member would respond promptly, much time, labour and expense would be saved the association. Will members please note this request? Follow-up reminders cost money to send, and these funds could be much better employed in providing for some of our activities.

Please honour your Association account when it is presented.

A meeting of the Montreal members of the Quebec Provincial Unit of the Osler Memorial Committee of the Canadian Medical Association met on November 10, 1927. There were present: Drs. C. P. Howard (Convenor), M. E. Abbott (Secretary), H. S. Birkett, F. G. Finley, H. D. Hamilton, A. G. Nicholls, and L. E. Pariseau.

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It was decided to enlarge the personnel of the Committee so as to make it more representative of the province as a whole, and to undertake in the near future an intensive campaign for funds.

Dr. Nicholls was appointed Treasurer for the Local Unit.

Two important resolutions were passed. The first: "That this Committee recommend to the Executive of the Canadian Medical Association that the first Osler Oration be given in Montreal at the Annual Meeting of the Canadian Medical Association in the year 1929, and that Dr. F. J. Shepherd be asked to deliver it."

The second: "That the Canadian Medical Association be asked to arrange a Section of the History of Medicine on the programme of the annual meeting, or, failing this, to provide for at least one paper treated from the historical standpoint.

It was felt that all that was required to make the movement a success was to make the objects more widely known among the medical profession.

Reports of Societies

MEETING OF THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES

The Thirty-eighth Annual Meeting of this Association was held in Montreal on October 24th, 25th and 26th, under the auspices of the Faculty of Medicine of McGill University. Dr. C. F. Martin, the President, occupied the chair.

The meeting was a very representative one, about one hundred delegates from over seventy medical colleges of the United States and Canada being present.

This organization, which represents one of the strongest influences in medical education in America, and which is recognized as the authority on all matters concerning university work in Medicine, has never before met in Canada.

In addition to the morning programme of technical papers on education, the afternoons were devoted to visiting the laboratories of the university and of the hospitals, and members were taken in groups to the departments that were of especial interest to each.

The arrangement of the programme was such as to allow the visitors to gain some idea as to the methods of Canadian medical education, and for that reason, Canadian speakers occupied a generous proportion of the programme.

Professor W. W. Chipman, of McGill University, delivered a most scholarly address on medical education in general and the teaching of obstetrics in particular. In his remarks Dr. Chipman stressed the importance of not overburdening the curriculum, in order to allow the student sufficient latitude both for work and for play. He was opposed on principle to an over indulgence in optional or electional courses, deeming it wiser for the student to be guided along liberal but well defined courses of education. Most of all did he emphasize the importance of developing great teachers in our medical schools His demonstration of the methods employed in his department for the teaching of obstetrics and gynæcology was illustrated by lantern slides.

A discussion of the teaching of anatomy was opened by an excellent paper by Professor J. B. Grant, of the University of Manitoba, who stressed the value of teaching his subject in a manner which would enable the student to understand function as well as form. He believed that memory was not so essential as a clear understanding of anatomical details. With a series of beautifully prepared charts he showed from many examples how readily anatomy could be made a pleasurable as well as a serious study. Of the Canadians, Professors Whitnall and Beatty, of McGill University, took part in the discussion and later guided the members through their anatomical museum, where demonstrations illustrating the various methods of Professor Whitnall's teaching technique were available to the visitors.

In the afternoon, in conjuction with a visit to the new Pathological Institute of the university, Professor Oertel gave a short address on the teaching of Pathology. In addition to the lectures and practical courses and conferences held in his department, he drew attention to the need of both scientific and cultural training in pathology, as well as on the medical and practical, concrete issues. His students are urged to do as much as possible by themselves. A visit to the new teaching museum in his department was much appreciated by the members of the Association.

On the second day a profitable discussion on the teaching of Medicine was held. Among the Canadians who participated were Professors Meakins and Howard, of McGill University, and Professor Graham, of the University of Toronto. At the General Hospital, Professor Rhea contributed a short address on the use of metabolism laboratories for hospital services, after which a visit was paid to the hospital wards and laboratories.

Excellent luncheons were served at the Royal Victoria and at the Montreal General Hospital, and on the evening of the first day a dinner was held at which Sir Arthur Currie gave an address of welcome, and the Honorable Athanase David spoke on methods of education as viewed from the standpoint of the French Canadian schools.

The business of the organization was carried out at a dinner on the second evening of the

Congress, Dr. Walter L. Niles, of New York. being elected President, and Dr. Burton W, Meyers, of Indiana, Vice-President, for the ensuing year.

OUT-PATIENT MEDICAL STAFF OF THE TORONTO GENERAL HOSPITAL

The first meeting of the medical out-patients' staff of the Toronto General Hospital took place on October 19th, Dr. George Young in the chair. *Dr. Clarke Noble* presented a case of syringomyelia. The details of the case were, that fifteen years ago, a woman now aged sixty-four, began to complain of loss of sensation to heat and cold in the fingers of the left hand. Touch was apparently unimpaired. As time went on, the right hand became affected in the same way, and eventually the hands, forearms, upper arms, and the back of the shoulders had lost all sensation to heat and cold, and the sensation to pain was distinctly blunted over the same area. A few years later wasting of the muscles of the left forearm and hand set in and progressed rapidly, while the left elbow joint became swollen to a marked degree and fixed though little if any pain was experienced. The left hand has progressed to the state of typical claw hand, with extreme wasting of the small muscles; the left elbow is enlarged to the size of a grapefruit and is solid and resistant; the x-ray of the joint does not show any effusion, but indicates that the lower end of the humerus is enlarged as a result of hypertrophic osteo-arthritis. The cervical and dorsal spine show a distinct degree of scoliosis and osteo-arthritis. The Wassermann test of the blood gave a negative reaction; and no departure from the normal was detected in the spinal fluid. The deafness of the patient made it difficult to outline the sensory changes, but fortunately the border lines were very distinct. The unilateral distribution of the motor paralysis was prominent from the first; now the right hand has begun to show wasting of the small muscles; this however, as Dr. Noble remarked, is a not infrequent happening. As long as the sensory changes were well marked and symmetrical, the diagnosis of syringomyelia was probable, though one felt many years might elapse before both arms showed the same degree of motor paralysis and muscular wasting. As is occasionally the case, this patient showed distinct signs of pupillary change; the left pupil was small and contracted. This might be due to involvement of the third nerve at its origin, or might possibly imply that the fibres going to the cervical sympathetic were involved in changes occurring near the cilio-spinal centre. Loss of sensation to pain was now so absolute that the patient was receiving many burns on her fingers some of which are still noticeable. Light touch is interfered with, but muscle sense remains.

Dr. Young in discussing the case spoke of the frequent association of spinal deformity in the cervical and dorsal areas, and remarked that as yet there had been no satisfactory explanation of the co-existence of this spinal deformity with disease of the cord itself. He also pointed out that in many cases the same curious changes in the pupils had been noted. Another interesting point in this case was the as yet somewhat unilateral affection of the motor system. The resemblance of some of these cases to amyotrophic lateral sclerosis is suggested by the wasting of the upper extremities combined with spasticity in the well preserved muscles.

Dr. Howard B. Lane presented the history and the autopsy specimens of a man aged 26, who had been seen fourteen weeks before, complaining of dizziness, with head-ache of a few days' duration. The patient presumably had had but little suggestion of illness up to the last few weeks of his life. It was found on a preliminary examination that he had a normal blood pressure, but a urine whose specific gravity was only 1001 and contained albumin in quite large amount; under the microscope only a few red blood cells were found. He refused admission but returned in a few weeks with the history of feeling indisposed for a few days, with pain in the back, and of having been in convulsions several times in the twenty-four hours preceding admission. At this time it was found that the albumin was markedly increased in amount, and there were red blood cells in the urine, and although showing very few physical signs, the non-protein nitrogen in the blood had reached the very high level of 245 to 296. From the urinary and clinical findings, the history of convulsions, and the high non-protein nitrogen, it was thought that the man had probably suffered for some years from sub-acute glomerulonephritis, and that the serious condition on admission was due to an acute exacerbation. After three days in the hospital the patient became unconscious and died.

At autopsy both kidneys were found to be of the small white type, the total weight of both being only sixty grammes; the microscopical picture was one of a far advanced contracted kidney of the chronic interstitial type. Of great interest in this man's case was the fact that though his kidneys showed that he had been the victim of chronic kidney disease for probably many years, yet he had been free of symptoms up to within a matter of four months before his death. The case would also seem to be one which shows unusually well the difficulty of determining the type of kidney lesion from the clinical symptoms and the physical examinations. With no symptoms complained of, with a low blood pressure, albumin in excess, and red blood cells in the urine, it was not to be wondered at that the sub-acute type of glomerulonephritis was diagnosed; the pathological findings however showed how wrong was the inference.

Dr. Gray reported the case of a woman aged 21 who had been admitted complaining of con-

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vulsions. There was the important detail in her history that she had had three convulsions at eleven years of age; these had occurred within an hour and there had been complete loss of consciousness. From her eleventh year, however, to the twentieth she had been perfectly well, had married and given birth to a healthy child. One year previous to her coming to the hospital and eight days after the birth of her first child, she noted that her right hand began to shake as she reached out for something and that the right side of the face felt numb and twitched. Later on in the same day, the same thing occurred and next day there were at least twenty repetitions of this shaking and twitching. For ten months there were no further symptoms noted, but at the end of this time there was a severe convulsion beginning with twitching in the face and hands and ending in unconsciousness. Two weeks later she had another convulsion, preceded by the same localizing twitching, and ending in loss of consciousness again; in this attack she was burned by falling on the stove. For the last two or three months there had been a spastic condition of her right hand with constant twitching and a very distinct interference with her speech, an interference which seemed to prevent her bringing into use the proper and necessary words. The patient stated that she was subject to severe headaches and that these were particularly severe just before her convulsions.

Physical examination was completely negative; there was nothing found in the urine or blood; the Wassermann was negative; an x-ray of the skull however showed a large area of calcification just under the dura in the left Rolandic area. The skull was opened on October 26., and a firm nodular mass was removed from Broca's area on the left side. The patient has progressed very favourably since the operation and is now free from twitching and her vocabulary is increasing daily. The mass that was removed showed an area of calcification in a cavernous hæmangio-endothelioma.

In the discussion which ensued, it was pointed out that this form of tumour may often be congenital and that they are of the nature of telangiectases. They are to all intents and purposes like the portwine stains or nævi on the skin. In many cases of hereditary familial telangiectases these tumour-like growths in the brain have been reported. In Sir William Osler's account of hereditary familial telangiectases this same condition of the brain is referred to. The history of convulsions at the age of eleven is important, as suggested by Spiller in cases of this sort there may be focal symptoms at different times because of transitory swelling or hæmorrhages. Dr. Gray was asked if his patient had shown telangiectases of the skin or had had the history of frequent nose-bleeds. Dr. Gray in closing the discussion said that there might be some difference between the condition found in his patient and the simpler telangiectases, but there was no suggestion of telangiectasia in the case.

Dr. Dow presented the case of a man, aged 62 years, who had been using the stomach pump for more than half his life, and who by this means has been able to keep himself in a reasonably good state of health. The story as given by Dr. Dow was that when the patient was nineteen years old he began to have symptoms of indigestion, such as gas formation, sourness in the stomach, with nausea followed by vomiting. This as a rule would give relief for a few days. A physician, whom he saw early in life, noticing that relief of the symptoms followed the vomiting, started the process of washing out the stomach: this always gave relief, so the patient was advised to buy a stomach tube and "to do his own washing." This was done and the patient has had a daily lavage for the last thirty-five years. At times the tube has had to be used before each meal; occasionally it was evident that the washing was not sufficient, for nausea and vomiting would still occur: he has always been constipated, but the appetite has remained fair throughout. He was seen by Dr. Dow in July 1927; it was noticed then that there was an area of tenderness in the epigastrium and that, although the patient was not cachetic, that he was thin almost to the point of emaciation. A barium series showed an almost complete obstruction at the pylorus, due, according to the radiologist, to a stenosing duodenal ulcer. There was sixty per cent residue in the stomach at the end of six hours and there were always traces of the barium to be found in the stomach after twenty-four hours; the pylorus could not be seen to open at any time. Concerning the washing, Dr. Dow suggested to the patient that after the evening lavage he should run in a pint of cream and two raw eggs through the stomach tube hoping that in the well-washed stomach, digestion would proceed without fermentation. In ten days under this line of treatment, in addition to a liquid and soft diet, the patient gained seven pounds and while under observation during past three months has added twenty pounds to his weight. Only a trace of free hydrochloric acid appeared in the stomach contents at the end of August, so the patient was given dilute hydrochloric acid, and this seemed to relieve the distension, the sourness, and any nausea that occurred; it also appeared that the stomach emptied earlier. There was no distinct anæmia at any time, red cells being 5,000,000, hæmoglobin 85 per cent; constipation has been relieved by the addition of a little milk of magnesia, and in general the patient has improved to a very marked degree. He seems quite unwilling to think of any operation and seems quite content to continue his daily lavage which has gone on for so long with so little annoyance.

In the discussion which followed, Dr. Young asked if it was likely that the whole condition had followed upon congenital hypertrophy of the pylorus. The patient stated that there had been trouble with his digestion from the first days of his infancy. Dr. Dow in his reply said, that no

tumour had ever been felt in the pyloric area and that the x-ray findings were more suggestive of an old scarring ulcer; the man's history was certainly against malignancy. Dr. Dow thought it a matter of great interest that a man could preserve his strength by any means in the face of such a complete obstruction. He was particularly impressed with the value of putting down a large amount of liquid food into the stomach. It should be insisted upon that careful lavage has a very distinct place in medical treatment, particularly, in cases of this sort; relief of congestion and catarrh probably lessens materially the narrowing of the pylorus. It was difficult to determine the nature of the obstruction; whether scarring ulcer, adhesions to a gall-bladder, or hypertrophy of the pylorus; all had been carefully considered.

Christie Street Hospital

At the clinical evening held at Christie Street Hospital on October 15th, there were presented several cases of particular interest. Dr. C. E. C. Cole showed a case that had recovered from pneumococcus meningitis. Cases of Paget's disease, syringomyelia, and melanotic sarcoma of the eye were presented by Dr. W. Baillie, Dr. C. L. Starr and Dr. W. W. Wright. Dr. R. I. Harris showed a case of a psoas abscess rupturing into the duodenum. Dr. J. A. Gilchrist presented a paper on the relationship of cholecystitis to diabetes.

N. B. Gwyn.

ACADEMY OF MEDICINE

Discussion of Relations Between Officers of Health and Practitioners

A special Academy meeting was called for October 25th, to discuss the relationship of the Department of Health to the profession, a relationship the peace of which seemed to be threatened by the announcement on the part of the Board of Health that they were intending to undertake the toxoid immunization of all the school children in Toronto. Members of the Department of Health, including Dr. Hastings and Dr. McCullough, were present by invitation, as were representatives from the Department of Hygiene and Preventive Medicine.

In introducing the subject of the evening's discussion, President McConnell stressed the need of co-operation between the general practitioner and the Department of Health if progress was to be obtained in handling any question which touched on the vital question of public health, and he urged the doctors present to remember that the ever-present problem of preventing the spread of infection was the aim of the officers of the Public Health Department, and that any desire to step between a doctor and his patients was always far from their thoughts.

Dr. J. H. McPhedran read the paper of the evening, in which he deplored the trend towards state medicine. An open discussion followed. Several Toronto practitioners stated that they seriously objected to the principle of generalized vaccinations and immunizations, as carried out by the Boards of Education and of Health, and said they felt a great injustice was being done to the general practitioner by removing from him this perfectly proper source of income. Direct charges were made that nurses employed by the Department of Health used their influence to send patients away from doctors to hospitals and clinics.

Dr. Charles Hastings was listened to intently as he rose to explain the position of the Department of Health. The collecting of proper records, he said, was most essential, and could only be done with any degree of satisfaction in schools, as it was an almost impossible matter to get from the general practitioner what his results had been with this or that procedure. He welcomed any investigation into the conduct of the employees of the department and urged any physician to lay before him the name of any offender against the laws of proper medical practice.

Dr. J. W. McCullough spoke in the same strain, and Dr. J. G. Fitzgerald detailed some of the activities of the Health Departments and Faculties of Preventive Medicine.

Dr. Cleland reminded the physicians present that it was not wise to make too great a bogey of state medicine. The same objections as were now being made against toxoid immunization had been urged against everything else that affected the population in bulk: vaccination, use of anti-toxins, 606, and quarantine, and it was foolish to say that the profession was being nationalized as a result of the state taking over the supervision of these details. Whether the profession would be the worse for a system of state medicine it was difficult to say: from what he had seen and heard in England, the panel system had not ruined the practice of medicine and had made all feel the long felt want. Workmen's compensation in this country had proved itself a blessing in spite of all evil prognostications. As to what medicine held in store for the graduate of the future it was difficult to foretell from the present outlook or from the picture held up to the student of the past. He still felt that his answer to anyone who should ask what the chances in medicine were, "If you are entering the study of medicine in the hopes of making out of it a fortune, forbear but if you are going into it with the idea of studying earnestly how best you can help humanity, then go forward."

Provincial and Local Association Notes

ANNUAL MEETING OF DISTRICT NUMBER ONE

The annual meeting of District Number One of the Ontario Medical Association, comprising the Counties of Essex, Kent, Elgin, Lambton and Middlesex, was held at St. Thomas on October 19, 1927.

At the morning session held in the Memorial Hospital, Dr. John Oille of Toronto gave a clinic on the Rheumatic Heart. There was a large attendance of doctors from the district. The clinic was very interesting and instructive. Luncheon was served by Miss Armstrong, the Superintendent, and her staff. In the afternoon Dr. George E. Wilson of Toronto gave a very practical address on Abdominal Pain, and Dr. L. J. Austin of Kingston gave an interesting address on Head Injuries. At the conclusion of the afternoon session many found their way to the famous St. Thomas Golf Club. Those who had never played golf before found how elusive the little ball could be. The day was concluded by a dinner at the Golf Club. After it Dr. Weston Krupp, President of the O.M.A., gave an instructive address on the future of the Association, stressing the desirability of telling the public what the medical profession is accomplishing. Dr. T. C. Routley, the untiring Secretary of the O.M.A., was in his usual form, and advised the profession to lead in reforms, or they would be driven by the public in a way that would not be to their liking. The evening finished with two solos by Mr. George Carrie, which were much enjoyed.

ANNUAL MEETING OF DISTRICT NUMBER FOUR

The annual district conference of District Number Four of the Ontario Medical Association, comprising the counties of Haldimand, Halton, Lincoln, Welland and Wentworth, was held in conjunction with the annual clinical day of the Hamilton Medical Society on Friday, October 14th, and was favoured with an unusually large attendance.

The programme for the day was arranged entirely by the Hamilton Medical Society, and included a combination of clinics by visiting clinicians and by members of the local society, as follows:

Clinic by Dr. E. M. Eberts of Montreal on "Blastoma, malignancy of the thyroid, and gall bladder disease." Clinic by Dr. R. R. Struthers, pædiatrician, on "Cases of malnutrition, difficult feeding, tuberculosis of infants and young children." The local doctors taking part were: F. B. Mowbray, A. D. Unsworth, W. O. Stevenson, who also presented a very interesting series of cases.

The evening dinner and conference was held at the Royal Connaught Hotel, and included addresses by Dr. Weston Krupp, President of the Ontario Medical Association, Dr. T. C. Routley, Secretary, Ontario Medical Association, and Dr. John R. Williams of Rochester, N.Y.

Drs. Krupp and Routley gave most interesting addresses, in which they discussed matters of interest to members of the Ontario Medical Association, and developments and problems that are now under consideration. Dr. Routley's address included a reference to his recent trip to the west, and referred especially to changes that are being considered in the medical services of the Prairie Provinces.

Dr. Williams also gave an interesting address, taking as his subject, "Diagnosis of Patients in coma," and citing many interesting cases that had come under his observation.

Dr. W. K. Colbeck was again elected Vice-Counsellor of the District for the coming year, and Dr. J. H. Holbrook was nominated for the position of Counsellor.

J. H. Holbrook,
District Counsellor.

ANNUAL MEETING OF DISTRICT NUMBER FIVE

The annual meeting of District Number Five was held in Osler Hall, Academy of Medicine, Toronto, beginning promptly at two p.m. on November 2nd. The heavy showers and bad driving undoubtedly lessened the attendance, but over 130 were present during the session. A group of interesting clinical cases and case reports preceded and followed the addresses given by Dr. Weston Krupp on "The Problems of the Ontario Profession," Dr. George Boyer on "The Management of Anterior Poliomyelitis," and Dr. J. Craig Small on "Recent Work on the Cause of Acute Rheumatic Fever and its Treatment." Dr. T. C. Routley emphasized the present threat of State Medicine unless professional solidarity were increased. Dr. Garnet McLean of Woodbridge was nominated for next Counsellor and Dr. W. A. Lewis of Barrie elected Vice-Counsellor to succeed him. The district members were the guests of the Academy for tea at the conclusion of the meeting.

C. E. Cooper Cole
District Counsellor.

ANNUAL MEETING OF DISTRICT NUMBER SEVEN

The annual meeting of District Number Seven was held at Kingston in the afternoon and evening of Thursday, November 3rd.

The scientific programme commenced at the Kingston General Hospital at 2.30 p.m. with an exhibition of cases reported by the members. Dr. W. T. Connell presented a case of Progressive Muscular Dystrophy. Dr. L. J. Austin and Dr. Jas. Miller presented a case of a tumour of the neck showing local amyloid degeneration. Dr. W. T. Connell presented a case of Arterial Claudication.

The principal communication was in the form of a symposium on Anterior Poliomyelitis, in which the following papers were read: The "Bacteriology" by Dr. G. B. Reed of Kingston; the "Early symptoms" by Dr. R. R. MacGregor of Kingston; the "Resulting deformities" by Dr. MacKenzie Forbes of Montreal.

At the evening session a dinner was held at the Frontenac Club, and was followed by an address by the President, Dr. Weston Krupp of Woodstock, and the Secretary's address by Dr. T. C. Routley of Toronto. The latter presented an outline of the work necessary in organizing the annual meeting, which is to be held at Kingston on May 29, 30, 31 and June 1, 1928.

An interesting historical paper was then read by Dr. Thomas Gibson on "Some Aspects of the Early Stages of Queen's Medical School."

At the business meeting which followed Dr. L. J. Austin was nominated for Counsellor; Dr. Bruce Hopkins was re-elected as Vice Counsellor; and a Committee was chosen to organize for the Annual meeting of 1928.

L. J. AUSTIN,
Counsellor.

MEDICAL SOCIETY OF NOVA SCOTIA, HALIFAX BRANCH

A clinical meeting of the Branch was held at the Victoria General Hospital on the evening of October 26th. The president, Dr. Murphy, was in the chair. Dr. Alan Curry showed a case of comminuted fracture of the lower third of the femur, with marked backward displacement, which was being treated with the Thomas splint and Buck's extension. The x-ray pictures indicated an excellent result. Dr. Curry also showed a boy, aged twelve, who was doing well after removal of a gangrenous appendix with which a localized peritonitis had been associated. There had been marked delirium. Comparison was made with two previous cases of a similar nature in children, aged five and seven respectively, both of which had resulted fatally. In Dr. Curry's opinion septicæmia existed in all three cases, although the blood in the third case gave negative cultures.

Dr. R. P. Smith demonstrated the post-mortem findings in two cases of brain tumour. The first case was that of a patient in Dr. Murphy's service, who had had a "fit" followed by drowsiness early in September. Apart from optic neuritis there was little else to point to brain tumour. A glio-sarcoma was found at autopsy, which involved the right frontal lobe and corpus callosum. In the second case, from Dr. MacKenzie's service, the patient (a woman aged 24) had had Jacksonian twitchings of the left side of the face for seven years. Symptoms of more recent development included twitching of the left arm, staggering gait, slurred speech, nystagmus, optic neuritis and paralysis of muscles supplied by the seventh and twelfth nerves. At the post-mortem examination a tumour involving the motor areas and a larger tumour involving the medulla and pressing upon the cerebellum were disclosed. A small round tumour was also found in the right suprarenal body.

Dr. Atlee showed a patient who had been admitted fifteen months previously, with an inoperable growth in the vagina. Radium treatment had afforded relief of symptoms until ten days ago, when the patient returned on account of pain in the right side and hæmorrhage. Her general health appeared to be very good. Dr. Atlee also demonstrated a number of pathological specimens of cancer of the cervix.

Dr. Curry presented two cases of tuberculosis of the hip joint recently admitted to the service of Dr. Hogan, both showing marked ankylosis and deformity. The treatment which is to be adopted was outlined.

After a general discussion, participated in by Drs. Burris, Morrison, Acker, and Little, the members were entertained at a very enjoyable supper by Mr. Kenney, the superintendent of the hospital.

On the evening of November 9th, the Branch met at the Nova Scotia Hospital, where the superintendent, Dr. Lawlor, and his colleagues Drs. Hopgood and A. R. Morton, presented a number of interesting cases illustrating acute confusional insanity, general paralysis of the insane, and different forms of dementia præcox. Emphasis was laid on the value of saline infusions in the treatment of toxic conditions, and reference was made to the methods recently advocated in the treatment of general paralysis. The members were given an opportunity to elicit the delusions of several of the patients, and found that wariness and mental agility may be used with conspicuous success in covering mental derangement. A strange inconsistency was noted in two patients, whose conversation rarely gave evidence of derangement but who did not hesitate to express their delusions in writing. After the conclusion of the scientific programme, Dr. Lawlor entertained the members at supper.

CLEMENT MACLEOD.

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Clippings on Current Topics

ENTERIC FEVER SITUATION IN THE WORLD*

The enteric fever situation was on the whole favourable in July in most European countries. In England the incidence decreased toward the end of July, while fewer cases than usual were reported in July in Denmark, Norway, Sweden and Finland. In England and Wales, there were 321 cases during the four weeks ended August 20th, as compared with 406 cases during the previous four weeks, although the incidence ordinarily increases markedly at this time of the year. In Germany, fewer cases were reported in July and early August than during the corresponding months of any previous year. It is to be noted in this connection that exceptionally cool and wet weather prevailed over the northern part of Europe in June and early in July.

Farther south in Europe the incidence may be characterized as normal, except in Italy, where it was above the normal (2,100 cases during the four weeks ended July 3rd, as against 1,274 cases during the corresponding period of the previous year). In the Serb-Croat-Slovene Kingdom, the incidence was also higher than last year and there was an outbreak in Belgrade, where 48 cases were reported during the first week in August; it seems to have been promptly controlled, as there were only ten cases the following week. The crest of the seasonal curve for enteric fever is not reached until September or October, but its low prevalence in summer in many countries is probably of good augury for the autumn. In the United States, 3,878 cases were reported during the four weeks ended July 30th, as compared with 3,493 cases during the corresponding period of 1926. In Canada, the enteric fever situation is entirely dominated by the formidable epidemic at Montreal. This epidemic, which appeared to be coming to an end in the latter half of April, broke out afresh early in May. There were nearly as many cases in the second wave as in the first. A recrudescence of this magnitude is a most unusual phenomenon.

Mortality statistics are on the whole more complete than morbidity statistics and are therefore more readily comparable for different countries—at any rate, for diseases in case of which the diagnosis does not present too great difficulties. As statistics of causes of death for 1926 are so far available only for a few countries, the enteric fever death rates for 1925 and 1926 are given below for groups of large towns.

	Population in Thousands	*Deaths*		*Rate per 100,000 pop.*	
		1925	*1926*	*1925*	*1926*
107 English towns..	19,411	183	140	0.9	0.7
16 Scottish towns..	2,396	24	23	1.0	1.0
3 Scandinavian towns	1,300	11	11	0.8	0.8
48 German towns..	17,024	336	483	2.0	2.8
47 German towns*	16,597	330	223	2.0	1.3
14 Dutch towns....	2,411	57	44	2.4	1.8
30 Swiss towns....	1,184	16	13	1.4	1.1
2 Belgian towns..	1,126	39	22	3.5	2.0
5 French towns..	3,932	222	214	5.6	5.4
7 Italian towns...	3,447	483	646	14.0	18.7
49 Spanish towns..	4,263	890	1,081	20.9	25.4
4 Czechoslovakian towns	1,176	97	84	8.2	7.1
4 Polish towns...	1,995	256	308	12.8	15.4
79 Ukrainian towns	3,460	443	528	12.8	15.3
2 towns of the U.S.S.R.	3,632	463	409	12.7	11.3
2 Egyptian towns	1,351	445	438	32.9	32.4
21 Japanese towns	8,741	...	2,325	..	26.3
4 Indian towns...	3,128	909	1,057	29.1	33.8
59 towns of the United States..	29,621	993	822	3.4	2.8

* Without Hanover.

It is seen that in Europe the incidence of enteric fever in general increases from north to south; in England and in the Scandinavian countries, the mortality is less than 1 per 100,000 inhabitants; in German, Dutch and Swiss towns it is mostly between 1 and 2 per 100,000, if we except the explosive outbreak at Hanover, when the death rate rose to 60.9 in 1926. In southern and eastern Europe the death rates from enteric fever are mostly between 10 and 20 per 100,000: in certain Spanish and Italian towns they exceeded 30. At Athens the rate was 39.3 and at Salonica 44.1 in 1924.

The mortality in European towns was on the whole lower in 1926 than in 1925, with exception of Spanish, Italian, Polish and Ukrainian towns, where the rates were higher.

Similarly in the United States, the mortality from enteric fever is mostly below 2 per 100,000 in the northern towns, but exceeds 10

Mortality in 1926 in Large Towns of the United States Grouped According to Geographical Divisions

	Population in thousands	*Deaths*	*Rate per 100,000*
New England	2,522	38	1.5
Middle Atlantic	11,399	241	2.1
South Atlantic	2,226	120	5.4
North Central	10,596	192	1.8
South Central	2,314	294	12.7
Rocky Mountain and Pacific	3,431	68	2.0

* League of Nations, Epidemiological Report of the Health Section, September 15, 1927.

in most towns of the south. It was on the average lower in 1926 than in 1925.

In sub-tropical and tropical countries, enteric fever is even more prevalent than in Southern Europe or in the southern states of the United States. The mortality per 100,000 inhabitants in 1926 was thus 38.9 in Cairo, 82.4 in Teheran, 68.9 in Calcutta, 29.1 in Singapore, 35.9 in Batavia and 29.1 in Manila. It is probable that in several of these towns the certification of causes of death is less accurate than in European towns and the rates may therefore in some instances be too low.

In South America, the incidence of enteric fever is lowest in the southern temperate climates and generally increases northward. The death rate from this cause per 100,000 was in 1926: 4.4 at Buenos Aires, 14.2 at Montevideo, 41.4 at Sao Paulo, 8.5 at Rio de Janeiro (low for the latitude), 33.7 at Lima and 92.8 at Bogota.

Mortality statistics for 1926 are available for the countries shown below; the rates do not differ greatly from those given above for large towns in the same countries.

Mortality from Enteric Fever in Various Countries in 1926

	Population in thousands	Deaths	Rate per 100,000
England and Wales	39,067	367	0.9
Scotland	4,903	39	0.8
The Netherlands	7,449	137	1.8
Switzerland	3,959	59	1.5
Germany	62,612	1,102	1.8
Czechoslovakia	14,353	1,183	8.2
Spain	22,128	4,747	21.5
Canada	9,291	461	5.0

HEART DISEASE IN PREGNANCY

Discussion in Section of Obstetrics and Gynæcology, at the Annual Meeting of the British Medical Association, Edinburgh July 30.

Prof. Munro Kerr (Glasgow) opened the discussion with a paper on Heart Disease. He pointed out that it was not yet decided whether the left ventricle hypertrophied during pregnancy or whether the extra effort was brought about by its latent reserve. Recent studies by Jensen and Norgaard showed that cardiac hypertrophy was normal and was associated with dilatation in 60 per cent of pregnant women. In late pregnancy the heart was displaced upwards and backwards. Normally there was no change in blood pressure, but variations readily occurred from metabolic disturbances. Next to examination of the urine, estimation of the blood pressure was the most important detail in antenatal examination. The pulse-rate was very easily disturbed in the later weeks, and the increase in body-weight, blood volume, and cardiac output all played a part in producing variations. Some of the functional disturbances encountered were due to pressure from the uterus; others were caused by disturbed innervation, altered metabolism, and glandular activities.

In the real organic cases there was general agreement that it was the condition of the heart muscle that determined the gravity of the case, but the problem was complicated by the insidious metabolic and glandular variations met with in pregnancy. Co-operation between physician and obstetrician had resulted in a consensus of opinion on distress signals and treatment. Figures from the Royal Maternity Hospital at Glasgow showed a mortality of 22 per cent; the average figure lay between 15 per cent and 25 per cent. All the fatal cases in Glasgow suffered from mitral disease,

Danger Signals.—It was most important that cardiac cases should be sent into hospital in time to give medical remedies a fair trial. All evidence indicated a general tendency to earlier and more pronounced decompensation with each succeeding pregnancy. A history of unsatisfactory or easily unbalanced compensation before the pregnancy gave cause for special anxiety. General evidences of failing circulation were more important as indications of danger than occasional cardiac irregularity. The prognosis became grave when cyanosis, œdema, albuminuria, and continuous crepitation appeared. For such cases Prof. Kerr always tried medical treatment for a week or ten days before terminating pregnancy. Where the heart was enlarged and other organs markedly disturbed the pregnancy should be stopped as soon as possible. Aortic regurgitation was not very common in pregnant women, but if uncompensated was very serious, especially with a "Corrigan pulse." Operative treatment should not be too long delayed, as once decompensation developed it was generally impossible to arrest it. Prof. Kerr's experience of mitral regurgitation agreed with that of Lennie, that if the cardiac muscle were satisfactory the prognosis was good. Mitral stenosis was most difficult to gauge and often caused most anxiety.

Treatment.—While in many cases the shortening of the second stage by forceps was all that was necessary, constant consultation between physician and obstetrician was required to determine the exact moment when operative interference was best indicated. The operative intervention was often the immediate cause of death, either through delay or through selection of the wrong method. Emptying the uterus was not a simple matter, and it was most important to choose the method which would cause the least shock. In the early months the cervix must be dilated, and stretching a sphincter had a pronounced depressive effect on the heart. If it were done gradually by tents time was lost, and tents were difficult to introduce aseptically in a primipara. The operation of election was vaginal hysterotomy. During the later weeks introduction of bougies was difficult in the primipara and there was no guarantee against one or two days' delay.

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The speaker was convinced that Cæsarean section would prove the accepted treatment of the future. The mortality figures in Lennie's series of 17 cases was 11 per cent, although including some of the worst cases, while the death-rate from the bougie method was 44 per cent. Moreover, this operation allowed sterilization and even hysterectomy in cases where it seemed advisable to stop the menstrual flow without interfering with the ovaries. Even where labour came on spontaneously there was an advantage in Cæsarean delivery, as the shock of dragging a child through the undilated vagina of a primipara was grave. The anæsthetic was a factor of considerable importance.

The puerperium.—Quite often heart failure set in three or four days after the labour had been successfully tided over. Two factors probably played a part in this: degeneration of the hypertrophied muscle-fibres and absorption from the decidual débris. Autopsy often showed evidences of a superimposed acute endocarditis. The puerperium therefore demanded particular care and attention.

Dr. Gibson Fitzgibbon related a series of 22 cardiac cases which had occurred among a total of 13,000 confinements during his mastership of the Rotunda Hospital. They were all cases of failure of compensation and showed a mortality of 22.7 per cent. From a review of these he divided such cases into three groups for prognosis. The first included those in whom decompensation only occurred as a result of labour and in whom prognosis was good. The second group was that in which decompensation occurred during pregnancy; if treated early and especially in a young primipara the prognosis was good, but was bad in the third group where decompensation was neglected until the onset of labour. The prognosis for the infant was good when the mother was treated. Decompensation did not tend to develop until the second half of pregnancy, but its onset was found progressively earlier as the number of pregnancies and the age of the patient increased. Over 75 per cent of compensated primigravidæ would go to term; one-third of them developed failure in labour, but they delivered themselves of living infants and recovered. Only 50 per cent of multigravidæ would go to term, and rather more of them than of primiparæ showed heart failure in labour. Compensation was more difficult to re-establish during pregnancy in a multipara than in a primipara, and there was a marked tendency to relapse during labour. After treatment the pregnancy almost always ended at the 36th or 37th week. Cardiac lesions tended to produce abortion and diminish the incidence of pregnancy Women who had shown no signs of heart failure might continue through labour, with especial care during the last eight weeks in a primipara and 16 weeks in a multipara. The latter would probably be best delivered by section at the 36th week if symptoms of failure had appeared, and should be sterilized. If symptoms appeared before the 30th week she should be delivered as soon as possible, as it was most unlikely that pregnancy would continue until a date of viability. Labour during decompensation was easy and rapid. In a subsequent pregnancy the case of decompensation in labour should be kept at rest from the 24th week, and pregnancy should be ended at the 36th week by section with sterilization. The case of decompensation during pregnancy should never be allowed to continue with another pregnancy. Induction of labour had no place in the treatment of decompensation, and at other times would be better replaced by section and sterilization

Prof. Louise McIlroy did not agree with Prof. Kerr's pessimistic outlook on cardiac cases. No other class of case had illustrated so well the value of antenatal work. She showed tables of 158 unselected cases, of whom 2 per cent died. Rest was the keynote of the treatment; it was no use to flog the failing heart of a poor working woman with digitalis and other stimulants. The obstetrician was useless in the diagnosis of heart conditions; the physician must be consulted. At the Royal Free Hospital an electro-cardiogram and a weekly antenatal cardiac clinic had been instituted. The majority of cases seen were mitral; next in number came the "toxic" heart. Only when every form of medical treatment had been tried in vain should pregnancy be terminated. If abortion was done once it would have to be done many times; the patients would come back again and again. It was a rule at this hospital never to do Cæsarean section unless the patient were in labour, and this had greatly reduced the number. Many apparently hopeless cases would go through labour easily and normally. Many young women might be able after some years of treatment and care to have a child again without danger; sterilization, therefore, was not desirable, and such cases were supplied with a contraceptive pessary on leaving hospital. The speaker did not approve of subtotal hysterectomy, as the absence of the menstrual outlet produced bad effects on the blood pressure.

STUDIES IN SCARLATINA

The impulse which the recent work of the Dicks has given to research in scarlatina is reflected in the medical journals, and some exceptionally interesting developments are to be found in the current number of *Acta Pædiatrica* (Vol. VI., Fasc. 3-4) which contains three separate papers on scarlatina. In one of them, Dr. Malmberg and Dr. Jacobsohn, of the Karolinska Institute of Stockholm, give an account of investigations with the Dick test in 1,200 children attending hospital up to the age of 15. In infants of only six months the reaction was positive only in 16.4 per cent. This percentage had risen to 48.8 in infants between 6 and 12 months old, and the greatest proportion of positive reactions was observed between the first and fifth years. Thus

between the years of three and four the percentage of positive reactions was 80.9. After the age of six there was a decline in the frequency of the positive reactions, the decline being at first slow and later more rapid. The supposition, credited to the Dicks, that persons who have had scarlatina give a negative cuti-reaction was not confirmed, at any rate as a generality. For among 802 children giving a positive reaction there were eight with a record of scarlatina. Among the 290 who gave a negative reaction there were sixty, or 20.7 per cent who had had scarlatina. Whether this negative reaction indicated a natural immunity or one acquired by an unnoticed abortive form of scarlatina is not clear. The consistency with which the reactions remained positive or negative when repeated once or oftener was investigated in many cases, and of 203 children giving a positive reaction on the first occasion as many as 190 did so on repetition of the test; only in two of these cases was the reaction definitely negative when repeated. Of the eighty-two giving a negative reaction on the first occasion, fifty-four continued to do so, and only in seventeen cases did the reaction become positive. (It should be noted that in each series of tests there were some cases of doubtful reactions). It would seem, then, that a positive reaction is a more constant and reliable phenomenon than a negative reaction. The paper by Dr. Gorter, Dr. Korte, and Dr. Munk includes an account of an epidemic of scarlatina in an asylum for mentally defective children. Of seventy-four boys, twenty-two suffered from scarlatina. Of the remaining fifty-two, only twelve gave a positive reaction. Next day one of these twelve developed scarlatina. Of the remaining eleven, six were given no specific treatment, yet some time later five of them were found to give a negative reaction, although in the meanwhile they had shown no clinical evidence of scarlatina. This observation would seem to indicate that immunity to scarlatina may be acquired by contact with it no symptoms are apparent. In the third paper Dr. Jundell and Dr. Lönberg, of the Karolinska Institute, give an encouraging account of seventeen cases of scarlatina treated with antitoxic scarlatinal serum, obtained from a horse immunized to a toxin-forming strain of streptococcus from a case of scarlatina. This paper also contains a useful summary of the work already done in connection with passive immunization against scarlatina.—*Lancet*, Aug, 20 1927.

RHEUMATIC HEART DISEASE IN CHILDREN

On October 1st a meeting was held at the Bristol General Hospital to consider a scheme which has been in preparation for some time for dealing with cardiac disease due to rheumatism. It was attended by the officers of the school medical services of Bristol, Gloucestershire, Somersetshire, and Wiltshire, including those of county boroughs within the border of these counties, and by consulting physicians practising within the same area. The objects of the scheme are research into the conditions under which children contract rheumatic heart disease, and assistance in the treatment of such children. Practitioners within the area have been invited to send brief notes of cases arising among their patients. The scheme is to apply to children between the ages of five and fourteen years inclusive, and is to apply to cases of heart disease arising in connection with rheumatism, chorea, or scarlet fever, and to cases which, though not arising in connection with rheumatism or chorea, are nevertheless rheumatic in type—that is, ventricular enlargement with mitral incompetence, with or without aortic incompetence or acute pericarditis.

It is believed that close attention to the problem of diagnosis of the disease in its early stage will be of immediate value to the school medical service. This has been the experience in Bristol, where the plan about to be described has been on trial for several years. It has been found that reference of children with signs suggestive of cardiac rheumatism to hospital physicians interested in the matter has resulted in the removal of restrictions with regard to school attendance, games, drill, etc., in a large number of instances; in others it has been the means of directing children in the early and more tractable phases of the disease into channels of treatment that might otherwise have been missed. The local authorities in the areas named have decided to make arrangements by which children, if the school medical officers think it desirable, may be seen at convenient places by physicians with special experience in the disease. The plan has the support of the Board of Education. The area comprised within these three counties is fortunate not only in having at its centre a city in which work of the kind has already been done, but also in possessing medical officers in all the areas who have already had administrative experience of similar organizations; moreover, they have undertaken to conduct inquiries into the conditions under which the children are living at the time of onset of the disease. Since the district includes wide varieties of soil, altitude, density of population, and so on, information of value should be forthcoming. The investigation, which was initiated by the subcommittee of the Science Committee of the British Medical Association appointed to inquire into rheumatic heart disease in children, has for its focus the University of Bristol Centre of Cardiac Research. This is housed at the Bristol General Hospital, equipped by the University of Bristol, and maintained by several grants. Among these may be mentioned one from the Medical Research Council for clerical expenses; also a Research Fellowship provided by the Colston Research Society, a Bristol organization. To complete the machinery which is being set up, it is hoped to devote a number of beds in the country hospital shortly to be built at Winford, near Bristol, to the treat-

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ment of cardiac rheumatism in childhood. The site has been carefully chosen, and is believed to be the best within a convenient distance of the city.

LORD IVEAGH AND THE LISTER INSTITUTE

Lord Iveagh, head of the Guinness family died October 7th, in his eightieth year. He was greatly interested in all institutions whose object was the prevention of disease. He made large donations to Trinity College, Dublin, and to the hospitals in that city and elsewhere, but it is as the largest individual contributor of our generation to the endowment of medical discovery in the British Isles that he is distinguished. In 1898 he gave £250,000 to the Lister Institute of Preventive Medicine, then the Jenner Institute, and about ten years later he, in conjunction with the late Sir Ernest Cassel, provided the funds for the erection, equipment, and endowment of the Radium Institute in Rider Street for the prosecution of research into the possibilities of radium as a therapeutic agent, and for the treatment of patients whose means did not permit of their receiving the benefits of radium treatment without financial assistance. In 1898 Lord Iveagh visited the Pasteur Institute, and the project of endowing a similar institute in London began to take shape. He consulted Dr. Thorne Thorne, the principal medical officer of the Local Government Board, who pointed out that it might be wiser to help the Jenner Institute than to found another separate institution. Lord Iveagh visited the Jenner Institute, and subsequently interviewed its chairman, Lord Lister, and Sir Henry Roscoe, its treasurer. Searching inquiries were made concerning the ideals, administration, and financial position of the Institute. Some years afterwards Lord Lister described this interview as a very critical examination; he was quite sure he had failed to satisfy the examiners. However, before many months were past, to his surprise and gratification, he received an intimation from Lord Iveagh that he desired to endow the Institute to the extent of £250,000, subject to certain alterations in its constitution and government.—*Brit. M. J.* Oct. 15, 1927.

AN ENDOWED RESEARCH INSTITUTE

The new pathological laboratory and research institute at the City of London Hospital for Diseases of Heart and Lungs, Victoria Park, the gift of the Prudential Assurance Company, was opened on July 19th by Mr. Neville Chamberlain, Minister of Health. Sir Alexander Kaye Butterworth, Chairman of the Hospital, in acknowledging the generous gift of the Prudential, announced that the necessary additional cost of equipping and fitting out the laboratories had been partially met by an anonymous donation of £500 and by a contribution of £400 from the Ladies' Association. He was further desirous of building up an endowment fund for research, and a start had been made by a gift of £250. Mr. A. C. Thompson, the Chairman of the Prudential, in welcoming the Minister, mentioned that his company had decided to provide the remainder of the money necessary for equipment, a further sum of £400. Mr. Chamberlain said that no Government department was engaged in such an unceasing warfare as was the Ministry of Health. In the last ten years the mortality-rate of pulmonary tuberculosis had been reduced by nearly 28 per cent, that of the respiratory disease by 34 per cent, and of heart disease by 3 per cent. From a national point of view. over two and a half million pounds was spent annually out of the rates and taxes upon the treatment of civilian cases of tuberculosis alone, and in considering the national loss a great deal had to be added to that figure for the waste of productive power and disablement. There were two directions in which he hoped it might be possible still further to reduce this drain upon the national resources—viz. (1) the improvement of the means of diagnosis, particularly perhaps in cancer and tuberculosis; (2) the provision of post-graduate education which would enable the general practitioner to keep up to date. *He welcomed the recognition by one of the great companies connected with the National Insurance schemes of the necessity for looking ahead and making provision for work which would ultimately be for the benefit of the country as a whole.* After the opening ceremony a garden party took place at which Lady Maud Carnegie was hostess, and the new laboratories were opened to visitors.—*Lancet.* July 30, 1927.

It appears that at the Harvard Medical School it is the custom of the professor of medicine, Dr. F. W. Peabody, to address the students on "The care of the patient." Dr. Peabody's text is that while the treatment of a disease may be entirely impersonal, the care of a patient must be completely personal; and he asks whether it is possible for the student to form such personal relationship in an impersonal institution such as a hospital. He finds that it is possible, and urges the student to approach the patient with sympathy, tact, and consideration, to get his confidence, so that the patient may come to regard the student as his own personal physician, and all the rest as mere consultants. Sickness, says Dr. Peabody, produces an abnormally sensitive emotional state in almost everyone; in many cases the emotional state repercusses on the organic disease. Even so-called functional diseases are just as real to the patient as organic disease; and the student's interest in the patient should not evaporate when organic disease has been excluded. Rather should he be stimulated to search further for the cause that has remained hidden, and so prepare himself for the more personal relationships which are inherent in the private practice of medicine.

Abstracts from Current Literature

MEDICINE

Lobar Pneumonia. Cecil, R. L., Baldwin, H. S., and Larsen, N. P., *Arch. of Int. Med.*, Sept., 1927, xl, 3.

The authors recall the now well known classification of pneumococci into four types, type IV being an assembly of all other types of pneumococcus: it is this group that occurs most frequently in the secretions of the healthy mouth. There has not been, however, any extensive study made in regard to the clinical manifestations of the various types, and the present paper presents the results of such a study. The series includes over 2,000 cases of lobar pneumonia treated at the Bellevue Hospital and is therefore large enough to allow of fairly safe deductions. Since the various types of pneumonia have certain definite characteristics that differentiate them from each other, the authors claim that typing should become a routine procedure. This can be done by injection of sputum or throat washings into a mouse. Blood cultures should also be taken.

Much of the information derived from this study is merely confirmatory of the modern teaching regarding the causation and course of pneumonia: as, for instance, that the pneumococcus was the organism responsible for the infection in 95.65 per cent of cases; the incidence of the various types, with types I and IV occurring most frequently; the death rates for the various types, showing that types I and IV are the milder forms, and II and III the more severe forms; and the relation of the death rate to age. Type I pneumococcus has a low death rate, presumably because it is the type which affects young people chiefly. Type III has a high death rate chiefly because it is the form that attacks elderly persons. It is to be noted, however, that complications (of which empyema was the commonest) occurred almost twice as frequently in type I infections as in the other three types.

In cases of mixed infection the combination which is by far the most common is that of the pneumococcus and the influenza bacillus. In keeping with this finding is the fact that mixed infections which vary greatly from year to year, are most frequent when influenza is prevalent.

The type of pneumococcus appeared to bear no relation to the lobe involved, nor to the extent of the infection. Nor could there be demonstrated any striking differences in the clinical course of the various types. The average duration of the disease for all types ranged from 8.6 to 9.1 days, type III running the longest course.

The relation between bacteræmia and the mortality rate was strikingly evident in all types. Among 240 patients in whom the blood culture was negative, the death rate was only 18.7 per cent: among 89 patients whose blood showed positive cultures, the death rate was 83.1 per cent. Another striking relationship was that between systemic disease and the death rate. In patients without any systemic disease, the death rate was 23.4 per cent; among those with systemic disease, the death rate was 46.4 per cent.

The authors hold that a knowledge of the type of infection present at once gives the physician a great deal more evidence on which to base his prognosis, his expectation of complications, and the feasibility of specific treatment. The last named point is not dealt with in this paper. H. E. MacDermot

Diabetes Mellitus: Incidence and Certain Etiological Factors. Friedenwald, J., and Morrison, T. H., *Arch. Int. Med.*, Oct., 1927.

In Baltimore between 1900 and 1924 there was a rise from 6.9 to 24.2 in the death rate from diabetes for each 100,000 of the population. A more marked increase was noted in Philadelphia until 1923. This increase was most marked in women of all ages and in men over 45. In Boston, diabetes has been two and a half times as frequent a cause of death among Jews as among the rest of the population.

The authors did a sugar tolerance test on 45 obese Jews of from 12 to 67 per cent overweight; 68 per cent of these showed a lowered sugar tolerance as compared to 57 per cent who showed a lowered tolerance in Paullin's series of obese patients in general.

The increased consumption of sugar in the United States, 100 pounds per capita per year, is simply an index to the tendency to the use of food in general far beyond the bodily requirements. This is especially true after middle life.

It is apparent that in order to lessen the incidence of diabetes the dietary habits of persons with a tendency towards obesity should be regulated, and adequate exercise should be instituted. Lillian A. Chase

Asthma and Tuberculosis in Relation to "Climate Allergens". Van Leeuwen, W. S., *Brit. M. J.*, Aug. 27, 1927.

This paper is a synopsis of three lectures given at London University. It deals with the author's work in connection with "climate allergens", as factors in causing asthma. He has been able to isolate a number of these substances in the atmosphere of places known to be bad for asthmatics. Some of these allergens

are moulds, such as are commonly found in damp houses, and he has proved their connection with asthma by cutaneous tests. These tests were positive in about 50 per cent of asthmatics.

With these facts in mind, a special clinic for investigation of allergic diseases was organized. It consisted of two houses which were specially selected, as being under unfavourable conditions of damp and bad construction. It was desired to prove that in spite of bad outside surroundings proper safeguards could make asthmatics comfortable. The object of these safeguards was to provide rooms for the patients in which no bacteria or moulds could grow. The walls were built of eternit, a kind of asbestos, and the furniture was of iron. The bedding was sterilized at regular intervals. Special ventilation with purified air allowed the patients to stay in these rooms day and night if they wished.

About 500 patients have been treated in the clinic with a highly encouraging percentage of cure or relief. Only about 1 per cent remained unaffected.

The employment of such purified air in the treatment of tuberculosis is then dealt with. It had been shown before that tuberculous cases frequently gave positive cutaneous reactions to extracts of the moulds already mentioned, and this, together with the fact that asthmatics and tuberculous patients show improvement at high altitudes, suggested that these allergen-free chambers might be of value in the treatment of tuberculosis. So far only a small number of tuberculous patients have been treated under these conditions, but Dr. Van Leeuwen feels that they have shown sufficient improvement to justify the conclusion that the allergen free chambers are as beneficial as high altitudes. All these patients had severe tuberculosis. They had been previously treated at home or in hospital, were well nursed and well fed, and yet when brought to this clinic in a damp and low-lying part they began to improve, although the only new factor in their surroundings was the protection from climate allergens by means of the special rooms.

Dr. Van Leeuwen claims no *cure* by this method for either asthma or tuberculosis. He feels, however, that these patients are undoubtedly sensitive to climate allergens, this sensitivity being superadded to the bacterial infection of tuberculosis and protection from the allergens should therefore be a valuable aid in treatment. H. E. MACDERMOT

Clinical Observations on Subacute Bacterial Endocarditis. Hurxthal, L. M., *Boston M. & S. J.*, July, 1927, cxevii, 41.

Sixty-five cases of subacute bacterial endocarditis are analyzed; twenty of these cases were seen or studied by the author himself. The diagnosis was supported by post mortem findings in twenty cases and by positive blood cultures in thirty-nine cases. Signs and symptoms referable to the respiratory system occurred in 75 per cent of the patients. It is suggested that in some cases emboli lodge in the bronchial arteries. Clubbing of the fingers or toes, with but one exception, was present only when the spleen could be felt; apparently splenomegaly develops before clubbing. Precordial pain occurred ten times; pain in the left or the right shoulder in four instances; nine cases had aortic lesions. There is a high incidence of renal lesions, but the kidney function, as measured by concentration tests, was usually very little impaired. Hypertension, such as is met with in chronic glomerulonephritis, occurred in but one of the sixty-five cases. In ten cases the spinal fluid was examined; the most common finding was a high cell-count, but no organism or growth was obtained on culture; apparently an aseptic meningitis was present, as a reaction to infarction. The author concludes that the clinical diagnosis of subacute bacterial endocarditis depends essentially upon the presence of embolic phenomena. HAROLD N. SEGALL

SURGERY

Traumatic Rupture of the Normal Spleen. Bailey, H., *The Brit. J. Surg.*, July, 1927.

This paper is founded upon thirty-two cases, three of which were under the author's own observation, and the remainder collected from the London Hospital records between 1894 and 1926. The condition is much less frequent in women than in men. There is usually the history of an accident in which the patient is run over by a vehicle or falls on a projecting object. There are four groups of cases according to symptomatology: (1) The patient who rapidly succumbs without rallying from the initial shock; (2) The patient who has the initial shock, recovers, and has the signs of ruptured spleen; (3) The patient in whom the signs of intra-abdominal disaster are delayed; (4) Those with spontaneous recovery.

In the first group there were three cases and in these there was complete avulsion of the spleen from its pedicle.

The second group is by far the largest. After the initial shock, there are signs of intra-abdominal hæmorrhage and it is not always possible to state precisely which organ is damaged. The signs and symptoms may be classified as "general" and "local". The author finds a blood-count of very little value in early diagnosis. There may be a relative leucocytosis, but this does not help to distinguish internal hæmorrhage from shock. Pal-

lor is important, but, when the diagnosis is uncertain, a clearly recorded half-hourly pulse chart is above all things of the greatest diagnostic value. With regard to local signs, abdominal rigidity is present in more than half the cases, but local tenderness is constantly found. Shifting dullness in the flanks is regularly present. Abdominal distension commences to appear about three or four hours after the accident. The author has noted Kehr's sign in three cases, that is, a referred pain in the left shoulder.

In the third group, there is delay of serious bleeding which may be explained in one of three ways: (1) The great omentum shuts off that portion of the general peritoneal cavity in the vicinity of the spleen; (2) A bloody coagulum temporarily seals the rent; (3) A subcapsular hæmatoma forms, and later bursts. An important point is the baffling friability of the splenic pedicle sometimes encountered. "Friable pedicle" appears to be the peculiar terror in this type of case, because it is found only in cases of this category, the explanation being that the pedicle, after being surrounded by mildly infected blood and blood-clot for a varying time, itself becomes œdematous and undergoes degeneration.

The only evidence we have for group four, that is spontaneous recovery, is that scars have been found in the spleen post mortem. These were evidently the result of an old injury, but, on the other hand, there are two specimens in the museum of St. Bartholomew's Hospital which contained recent scar tissue. Hæmorrhagic solitary cysts of the spleen are generally attributed to injury. Early operation for splenectomy is the treatment indicated

The author mentions the value of blood transfusion while the patient is on the operating table, either by blood obtained from a donor, or, the blood from the abdominal cavity may be removed, filtered and introduced into the circulation.

He divides the complications into "early" and "late". The early complications are: (1) Peritoneal effusion; (2) "Burst abdomen", the result of the wound bursting open and having to be resutured. The most likely explanation for this condition is that pancreatic ferments digest the edges of the abdominal wound and the catgut contained therein; (3) Left pleural effusion; (4) Persistent hiccough; and, (5) Splenic asthenia. In this latter condition the patient commences about the tenth day to become progressively emaciated; he often has pyrexia and irritability of temper. The late complications are: (1) Attacks of palpitation when lying upon the left side; (2) Fleeting bone-pains like rheumatism; and, (3) Attacks of vomiting.

Experiments on animals have led investigators to believe that splenectomy lowers the patient's resistance to infection, but, in no instance has the author been able to find in the human the slightest indication that a splenectomized person is more susceptible to infection.

R. V. B. SHIER

Pneumonography with Iodized Oil, Forty Per Cent, by the Bronchoscopic Method. Ballon, David H., and Ballon, Harry C., *Arch. Surg.*, Jan., 1927, xiv, 184-202.

The authors injected the bronchial tree in the living with iodized oil (40 per cent) by the bronchoscopic method; in post mortem specimens, the blood vessels were first injected with barium sulphate in gelatine, and the bronchial tree was later injected with paraffin, and its relationship to the circulation studied.

The arterial system may be said to be a fairly close reduplication of the bronchial tree.

The physiology of respiration in the normal and pathological lung was studied. A double exposure was taken on one film during deep inspiration and full expiration. In this way one can compare the changes occurring during respiration in the bronchi, bronchioles, and lung parenchyma, as well as observe the movements of the clavicles and ribs and the excursions of the diaphragm.

At various age periods the appearance of the normal bronchial tree after the injection of iodized oil appears to be the same. Abnormalities of the bronchial tree were found to be frequent in chronic fibroid phthisis, disease of the pleura and mediastinum, and bronchiectasis.

The main bronchi, in their extrapulmonary and non-branching intrapulmonary portions, may be the site of stenosis and new growth. Bronchial stenosis is often found to be associated with bronchiectasis or pulmonary abscess. The branched intrapulmonary bronchi are the most frequent sites of disease, such as bronchiectasis, putrid bronchitis, bronchiolitis, bronchiolectasis.

Bronchiectasis is classified in two main divisions, clinical and pathological, with numerous subdivisions. In the clinical division we find five roentgenological types, based on the injection of iodized oil (40 per cent). The types are grape-formation, clubbing, cylindrical, saccular, and bead formation.

The bronchial tree after extrapleural thoracoplasty for tuberculosis may undergo numerous changes, and becomes a large tube associated with localized or generalized bronchiectasis at the base. When the bronchiectasis extends to the periphery, methods of collapse should give better results than when the dilatations are basal.

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Iodized oil, by the bronchoscopic method, is an aid and a guide in the selection of suitable cases for the thoracic surgeon, and in the prognosis and treatment.

Ordinary roentgenograms of the bronchial tree are unsatisfactory and often confusing, owing to the fact that the bronchial tree divides frequently and is repeatedly crossed by part of the pulmonary circulation. It fails to give any information as to the site and extent of the disease.

The importance of the accurate interpretation of roentgenograms made after the injection of iodized oil must be emphasized. A positive shadow cast by an injection which cannot be adequately explained on the basis of clinical history, signs, symptoms, and bronchoscopic examination should not be considered. A typical shadow, when substantiated by a clinical picture, allows of no discussion.

D. H. B.

Primary Carcinoma of the Bronchus with Abscess of the Lung Diagnosed Bronchoscopically and Injected with Lipiodol. Ballon, David H., *Med. J. & Rec.*, Feb. 16, 1927.

Ballon reports a case of a man, forty-three years of age, who had in February, 1925, a cholecystectomy under ether anæsthesia, for chronic cholecystitis with cholelithiasis. A few days after the operation the patient developed symptoms suggestive of lung abscess. After six months of conservative treatment he was admitted to the Royal Victoria Hospital in August, 1925, and was operated on by Dr. F. A. C. Scrimger for a lung abscess of the left upper lobe. In spite of adequate drainage the patient did not do well.

A bronchoscopic examination, including a lipiodol injection performed under local anæsthesia, because of persistence of symptoms, revealed a growth of the left main bronchus, which proved to be a primary carcinoma of the bronchus. The left bronchus was fixed and completely obstructed by bleeding polypoidal granulations. Twenty-five c.c. of lipiodol was injected into the left lung by the bronchoscopic method, but, as was expected, the lipiodol entered the obstructed left lower bronchus only for a short distance, and showed a silent unfilled area of the left lower lung, while the greater part of lipiodol ran over into the right lung and showed a normal filling.

The ordinary x-ray report, prior to injection, suggested a thickened pleura or lung abscess.

The sections showed a rapidly proliferating and infiltrating tumour of epithelial origin, embedded in a fibrous connective-tissue stroma.

The patient died in June, 1926, from bone metastasis in the left ilium and right femur.

D. H. B.

Pelvic Lesions of Infectious Origin. Curtis, A. H., *J. Am. M. Ass.*, Oct. 8, 1927.

The bacteriology of chronic leucorrhœa reveals Skene's ducts and the uterine cervix to be the chief sources of infection. We must not confine our attention to the cervix and ignore these ducts in the female urethra.

The diplococci present in vaginal discharges are frequently capable of becoming virulent pathogenic organisms, and so constitute a grave danger to the pregnant woman. Granulations and strictures of the cervical canal interfere with drainage and so prolong the inflammation; this is also true of an abnormally viscid cervical secretion. The electric cautery is successful, partly at least because it improves drainage.

The body of the uterus seldom harbours chronic infections, the most frequent instances of acute endometritis occurring after such operations as diagnostic curettage, and repeated invasion after abortion to remove a residual fœtus. A bacteriological study of the Fallopian tubes shows that the gonococcus has disappeared two weeks after the fever and leucocytosis have subsided. Again, a single attack of salpingitis seldom does much permanent damage. "Chronic" salpingitis is really a recurring condition, resulting from several reinfections. At the same time, the gonococcus will live for a long time in the vaginal secretion. Dr. Curtis thinks that surgery should only be used for the sequelæ of salpingitis, adhesions, and prolonged menstruation indicating inflammation of the ovaries. Adhesions of gonococcal origin are not usually firm and can be easily broken down, but they are apt to be very numerous, causing interference with the sigmoid and left abdominal pain.

The ovaries should not be removed unless one is convinced that the inflammation is streptococcal. At the same time a small portion of one should not be left to prevent menopause. Operation should never be performed on acute salpingitis. Enormous, thickened pus tubes are evidence of continued reinfection and the patient should be given the choice between abstinence and radical removal of genitalia.

P. M. MACDONNELL

Irradiation of Vesical Neoplasms by Removable Platinum Radon Seeds: Description of New Instruments Designed to Facilitate their Employment. Muir, J., *J. Urol.*, January, 1927, xvii, 53.

An improved method of treating neoplasms of the bladder by means of removable platinum radon seeds is described in this article. By means of these seeds it is claimed that it is possible to obtain accuracy in the dosage delivered. Radiation is directed not only to the growth itself but to the tissues surrounding it,

in order to catch the mitotic cell. The placement of the radio-active units is made so that the "zones of potential tissue change" from each source do not overlap. The "zone of potential tissue change", by which term we include the amount of tissue that one seed can take care of when implanted alone, and also the amount when two or three centres for seeds are used so that intervening cells are subjected to cross firing, are described. The theoretical exposure has been proved by clinical results.

Not only are we able to deliver accurate dosage, but by means of the platinum screenage the caustic rays are eliminated, and necrosis and sloughing with shock to the patient are obviated. The fact that these seeds are easily removed through the cystoscope after the required amount of radiation has been delivered makes this the method of choice, since no foreign body is left in the tissue after treatment.

A point of great importance in using these platinum radon seeds is that after the first seed has been implanted the cystoscope, through its thread, protruding from the portal of entry of the seed, serves as a landmark and guide for the placing of successive seeds, so that the accuracy of their position is greatly increased by means of the cystoscope. Should a seed be incorrectly implanted, it may be removed and re-implanted.

In view of the highly simplified technique as described, the treatment of vesical neoplasms by implantation of these seeds can be accomplished with as much accuracy as any other urologic procedure.

OBSTETRICS

The Nasal Application of Pituitary Extract for the Induction of Labour. Hofbauer, J., Hoerner, J. K., and Aliver, K. S., *Am. J. Obst. & Gynæc.*, Aug., 1927.

Pituitrin, as a uterine stimulant, was introduced into obstetrics by J. Hofbauer in 1911. Since then, opinion as to the advisability of its use intramuscularly has wavered, inasmuch as untoward effects sometimes occur to both mother and child. The present study was undertaken in an endeavour to find a safe method of inducing labour, which was technically simple.

At first a modification of Watson's method was tried. The pituitrin was given every half hour for 4 doses *orally*, the patient being instructed to hold the drug under the tongue, since the sublingual mucous membrane absorbs more rapidly than the buccal mucosa. In about 45 per cent of cases, this method was successful in stimulating uterine contractions.

As this was not entirely satisfactory, 20 minims of the drug were applied to the inferior turbinate of one nostril on a piece of absorbent cotton. This was left in place for one hour, when a fresh pledget containing the same amount of pituitrin was applied to the opposite turbinate. Usually 2 applications sufficed, but three or four may be used. The results were most satisfactory. It was successful in all of the 32 toxic cases in which it was tried, but the nephritic cases required larger quantities of pituitrin to initiate labour than did the pre-eclamptics. In no case was the blood pressure elevated by the pituitrin, but in the pre-eclamptics, unless a smaller dose than usual was used, the uterus showed a tendency to contract tetanically. When this occurred, withdrawal of the pituitrin from the nose caused the uterus to relax at once. For this reason, all patients should be carefully watched for the first 20 minutes. All the babies were born alive in this series. The nasal method of applying pituitrin is considered the safest and most reliable means of inducing labour.

ELEANOR PERCIVAL

OTO-LARYNGOLOGY

Tinnitus Aurium. Sturm, J. P., *J. Laryng. & Oto.*, July, 1927.

In this paper the author suggests that the reason children rarely complain of tinnitus is because the cochlear and vestibular aqueducts are relatively and actually larger in them than in adults.

Some of the latter may have tinnitus because of the narrowness of these openings, and any interference with the mobility of the foot plate of the stapes or of the membrane of the round window will raise the intra-labyrinthine tension, yet, however wide these outlets for the endolymph and perilymph may be, if the stapes be fixed and the blood pressure raised, the patient developes tinnitus because there is a loss of ability to compensate for those variations in labyrinthine pressure which are secondary to pressure phases of the general circulation. That is, the absence or presence of tinnitus where the pressure comes from the tympanum depends upon the adequacy or otherwise of the aqueducts. When the rise in pressure is secondary to high vascular or cerebro-spinal pressure, the presence of tinnitus depends upon the mobility of the stapes and round window.

As long as the tympanic membrane is in working order, no pressure tinnitus is likely to occur. Retraction however of the drum head by tensor spasm does not raise intra-labyrinthine pressure so long as the stapedius muscle is intact. But, as both the tensor tympani and the stapedius are striped skeletal muscles controlled by upper and lower motor neurones, either may go out of action with a

resulting spastic or flaccid paralysis and consequent interference with the mobility of the drum head.

Another factor which he thinks cannot be ignored is variations in the quantity of the endolymph. Possibly the efferent fibres in the eighth nerve, whose distribution is labyrinthine, may be associated with the increase of the endolymph. Afferent impulses from peripheral sources, including the tympanum, may give rise to hypersecretion of endolymph and the control of the resulting tinnitus by atropine could be explained by its paralyzing effect upon the secretory nerves.

The author briefly reports a number of cases in which he has used atropine locally to control or modify tinnitus aurium. Liquor Atropinæ was introduced into the middle ear through a perforation in the drum membrane or through the Eustachian tube. An attempt was also made to introduce it through the sound drum head by dissolving atropine sulphate in alcohol, and then in aniline oil; this causes immediate congestion of the drum head. The author's observations have not been confirmed by other workers; but he has seen such definite improvement occur, even in otosclerosis, that he thinks his results worth recording. G. E. HODGE

PÆDIATRICS

Scarlet Fever and Diphtheria Prevention Reactions and Observations in 2,000 Immunizations. McBroom, D. E., *Minn. Med.*, October, 1927, x, No. 10, 596.

McBroom performed the Dick test on 421 institutional children and found that 84 gave positive reactions. These 84 were given 3,000 skin test doses of Larson's sodium ricinoleate scarlet fever vaccine. Thirty-four per cent gave no reaction; 21 per cent, slight; 25 per cent, moderate; and 19 per cent, severe reactions. Subsequent Dick tests showed that 78 per cent became Dick negative, and 42 per cent remained negative to 10 skin-test doses after eighteen months.

In a second larger series he used Larson's diphtheria and scarlet fever vaccine combined. A total of 5,793 doses were given to 1,931 persons of all ages, and two-thirds gave no reactions of any kind to any of the injections. Of the remaining third only 25 per cent had severe reactions, and only two persons had general systemic reactions. More reactions occurred following injections into the deltoid region than into the gluteal or subscapular muscles. The author concludes that the combined vaccines produce no greater reactions than when either is used alone, and that the injections are valuable in preventing the disease. R. R. STRUTHERS

Renal Infantilism, Report of a Case and a Review of the Literature. Hunt, F. C., *Am. J. Dis. Child.*, August, 1927, xxxiv, No. 2, 234.

There is a form of interstitial nephritis that occurs in children and gives rise to dwarfism and frequently bony deformities. It presents a clinical picture to which the name renal infantilism has been applied. Hunt reports in detail such a case and gives an extensive review of the literature, including 54 instances. As regards the etiology, infection undoubtedly plays the major rôle, though neither the primary focus, nor the time of onset of the renal lesion, has been definitely established in any case, the supposition being that it dates from intra-uterine existence.

It is possible to divide all signs and symptoms into two groups. First, those referable to physical development; and second, those referable to altered kidney function. Under the first heading may be grouped abnormalities in height, weight, bony structure, and mental development. The outstanding features under the second division are polydipsia, urinary changes, cardio-vascular lesions, gastro-intestinal disturbances, retinal changes, skin pigmentation, and alterations in the blood chemistry.

The retarded development is a characteristic feature, height and weight being closely parallel. The bony changes are frequently mistaken for the late type of rickets. Mental development and secondary sexual characteristics are delayed. Polydipsia, polyuria, and cardiac hypertrophy occur. Periodic attacks of vomiting are noted and the persistence of an infantile type of diet, of milk and cereals. Papillœdema and albuminuric retinitis, or hæmorrhage, may occur. The skin may assume a dirty, yellowish brown pigmentation. Blood chemical examinations show retention of urea nitrogen, uric acid, and creatinine.

Post mortem examinations show the general picture in the kidney of advanced chronic interstitial nephritis. The bones show failure of ossification and decalcification of the diaphyses, thickened epiphyseal lines and frequent fractures. The heart manifests varying degrees of hypertrophy of the left ventricle. Death occurs with convulsions and coma, hastened by acute infection. R. R. STRUTHERS

Obituaries

Dr. Thomas A. Swift. On October 24, 1927, one of the pioneer physicians of the Fraser Valley, B.C., answered the last roll-call. Dr. Swift was born in Granby, Quebec, forty-seven years ago. He graduated from McGill in 1906, coming to British Columbia a short time later. In 1908 he located in Abbotsford, B.C., where he continued to practice until the time of his death. He was married in 1910 and leaves a widow, one son and one daughter.

Dr. Swift was not of the rugged or robust type and repeated attacks of influenza took their toll. During those attacks he would constantly neglect himself to minister to a large and scattered clientele. In July, 1927, he took a much needed rest and visited eastern Canada, returning home in September. On October 22nd, cerebral embolism developed, from which he did not rally. His funeral was held on October 26th, and was attended by friends from a very wide area.

Dr. Swift typified all that was best in the general practitioner. Locating in Abbotsford in 1908 he was called upon very soon to assume the duties of a large and scattered practice in all weathers and often over

DR. THOMAS A. SWIFT

very primitive roads. During those years he always found time to keep abreast with the progress of medicine and surgery. He was the moving spirit in having erected in Abbotsford the Abbotsford-Matsqui Sumas Hospital, an institution which, from the standpoint of efficiency and service, would be a credit to a city. In this hospital Dr. Swift practiced surgery of a high class. His work in the practice of his profession was recognized by all to be of a high standard.

He died in harness much beloved by the community he served so well. He was greatly respected by all his confrères. He loved humanity and in its service he wore his life away.

Dr. H. S. Churchill died at Port Nelson on October 27th, and was buried on October 31st. During the war he had a distinguished record. Enlisting as a private he gained the Military Medal with bar; later he obtained his commission as lieutenant in the 8th Battalion C.E.F., was wounded, and received the D.S.O. with bar. He graduated in medicine from the University of Manitoba in 1924, and for over two years was senior interne in internal medicine in the Winnipeg General Hospital, where his knowledge of the patients and his skill in collecting and correlating clinical data contributed much to the success of the weekly ward rounds. To sick patients he was especially considerate and esteemed no sacrifice too great if it would contribute to their comfort. He had been practising at Port Nelson only a brief period when his untimely death cut short a career of much promise.

Dr. Edward Dominick Farrell, who died at New York on October 17th, after a somewhat protracted illness, was a son of the late Dr. Edward Farrell whose memory is revered by the older generation of Halifax folk. After graduating from Dalhousie in 1899, Dr. E. D. Farrell practised in Halifax for several years, but other than medical interests came to absorb more and more of his time, and for the past few years he spent little time in Halifax. His death, at the early age of fifty-two, is mourned by a wide circle of friends, and his funeral at Halifax was largely attended by people from all walks of life.

Dr. Edwin Johnson Elderkin, who died at his home in Weymouth on October 23rd, was one of the best known practitioners in the western part of Nova Scotia. He graduated at McGill in 1894. After a few years in practice at his old home, River Hebert, he went abroad for graduate study and obtained the license in midwifery and L.R.C.P. of Edinburgh in 1889. The following year he located at Weymouth, where he continued to practise until stricken by pneumonia, which quickly proved fatal. Dr. Elderkin possessed in an eminent degree those qualities of head and heart which command the respect and affection of his associates, and in his passing the profession of Nova Scotia has lost a member who was always kindly, courteous, and sincere, a skilful practitioner, ever scrupulous in maintaining the best traditions of our art.

Dr. E. D. Graham died at his home in Keswick on October 23rd. A graduate of Toronto in 1894, he received his degree in medicine from Trinity in the same year. He was a man held in highest esteem by his numerous patients in Queensville, Keswick and the neighbouring districts where he had practised for 35 years and won the confidence of all.

Dr. W. L. Gray died in Pembroke on November 6th, after 45 years of practise in the Ottawa valley. Graduating from McGill in 1881, he was a student of Osler, Shepherd, Roddick, Howard, Gardner and the great group of men who did so much to spread abroad the fame of McGill as a teaching institution. After graduation he studied in Vienna. He was well known as a physician of exceptional ability.

Major-General Sir William G. Macpherson died on October 15th at his London residence, aged 69. He was remarkable in many ways: a good physician, an able administrator, and a very distinguished soldier. When the war broke out he was at the War Office, and was among those who bore the brunt of the great "rushes" of casualties resulting from the early battles. Almost over night General Macpherson was called upon to improvise hospital and other accommodation, and to collect within a few days medical and surgical supplies on a vast scale. In this emergency he shone

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conspicuously. Later, he became Director of Medical Services with the troops in Mesopotamia; Director of Medical Services with the First Army; and Deputy Director-General at the General Headquarters. In all the positions he occupied his work was of the highest order.

By future historians he will be especially remembered as the Editor-in-Chief of the Medical History of the Great War. To this task he brought great knowledge, experience, and judgment; nothing of importance was left out, and nothing irrelevant was put in. This great work will remain as a model of what such a history should be.

Dr. Robert Ernest McConnell, a graduate of McGill University both in Arts and Medicine died in Colon, Panama, after an operation for appendicitis, regarded as an indirect result of an attack of typhoid fever.

After his graduation in medicine in 1900, he went as medical officer with the Canadian Contingent to South Africa, and while there did good service, in the field and afterwards in charge of a Boer prison camp which held about 6,000 men. Dr. McConnell remained in South Africa after the close of hostilities, and after a short connection with a mining company he entered the service of the British Government, doing special research work of a brilliant character in connection with an investigation of sleeping sickness. During the world war he served as Captain in the British Forces in Eastern and Central Africa, and in 1917 acted as chief medical officer with the Uganda Column under operation in German East Africa under General Smuts. Dr. McConnell was much interested in anthropology and contributed several studies to the *British Anthropological Journal* on the various African tribes. He was a Fellow of the Royal Anthropological Society of London and also of the Royal Entomological Society of London, and a charter member of the Delta Upsilon Fraternity of McGill University. He was the author of several papers which were published in the *Journal of Tropical Medicine*. Dr. McConnell married Miss Elizabeth Burrows Ladd, daughter of the late Governor of Rhode Island, who survives him together with a son and daughter, both of whom are at present with their mother at their grandfather's house at Ladwood, Matinneck, R.I.

News Items

GREAT BRITAIN

On October 20th, the Right Hon. Stanley Baldwin, formerly a student of Mason College, Birmingham, formally opened the new biological building of the University of Birmingham and the Chancellor's Hall, a hostel for male students. Mr. Baldwin received on this occasion the honorary degree of Doctor of Laws. A reminiscence of his Canadian tour was noted when he referred, in the course of his remarks, to the value of corporate life among university students, a value seemingly less understood in England than it was in Toronto.

The new School of Biochemistry at Oxford was opened on October 21st, by the Chancellor, Lord Cave. The institution owes its existence to the Rockefeller Trustees, who donated £55,000 to meet the cost of the building and its maintenance, on condition that the University would contribute the sum of £25,000, or its equivalent, annually.

The Fellowship of Medicine, and Post-Graduate Medical Association announce the following programme for the year 1928. The Metropolitan Hospitals associated with the Fellowship of Medicine permit Post-Graduate Ticketholders to attend their daily practice—ward rounds, out-patient departments, operations, etc. Detailed information supplied by these hospitals is arranged in diary form and published by the Fellowship. A comprehensive ticket for this hospital practice (General Course) is issued at the following rates: one week £2. 2. 0., two weeks £3. 3. 0., one month £5. 5. 0., two months £9. 9. 0., three months £12. 12. 0., Six months £18. 18. 0., and one year £21. Special arrangements made for practitioners unable to do whole-time study. Copies of the General Course Programme are obtainable on application to the Secretary of the Fellowship.

Apart from this General Course, Special Courses are organized by the Fellowship in co-operation with most of the London Special and General Hospitals. Fees range from £1. 1. 0. to £7. 7. 0.; full particulars and detailed syllabuses are obtainable from the Secretary of the Fellowship, 1 Wimpole St., London W.1.

SOUTH AFRICA

Medical Education in the Transvaal

Dr. Raymond A. Dart, dean of the faculty of medicine in the University of Witwatersrand, Johannesburg, contributed to the *Journal of the Medical Association of South Africa* for July 23rd an interesting account of the development of medical education, including post-graduate teaching, in this part of South Africa. So far back as 1903 the establishment of medical and dental instruction in Johannesburg was projected, and, after some delay, a standing committee for medical education was appointed in the Johannesburg General Hospital in 1914; three years later the School of Mines became the University College, Johannesburg, and the first year of a medical curriculum was inaugurated. A complete dental course was provided in 1925. Meanwhile, regulations for the Diploma in Public Health had been drawn up, and in 1926 post-graduate courses for this diploma were started. Johannesburg offers exceptional facilities for instruction in tropical medicine and hygiene, since it is surrounded by tropical and sub-tropical areas. It is thus the one large centre of European medical training where a wide range of tropical diseases can be studied on the spot where they occur; moreover, it contains a large European population from which post-graduate students can be obtained. Dr. A. J. Orenstein was appointed lecturer in tropical medicine and visiting physician in tropical diseases, and, pending the forma-

tion of a tropical disease unit in the general hospital, arrangements have been made for a number of beds to be under his charge. The course of instruction in tropical sanitation and hygiene has been designed by Dr. Charles Porter, one-time medical officer of health for Johannesburg, and the courses in tropical pathology and pathological chemistry are being given by Dr. Sutherland Strachan, Dr. Annie Porter taking charge of the parasitology, including protozoology, helminthology, and entomology. The last two teachers belong to the staff of the South African Institute for Medical Research, and are also lecturers in the medical school. The greater part of the laboratory work of the course is conducted in the Institute buildings, with the cordial co-operation of the director, Sir Spencer Lister. Diploma courses in tropical surgery, ophthalmology, dermatology, and pharmacology are being arranged.—*Brit. M. J.*, Oct. 8, 1927.

GENERAL

An announcement from the medical faculty of the University of Vienna states that the usual post-graduate course would begin on October 1st. Short courses of two weeks duration would be given on such subjects as diseases of the heart and blood vessels, syphilis, dermatology, and diseases of children. These courses would include all recent advances in medicine and therapy. Longer courses of a month each, covering all branches of medicine can also be obtained. Instruction will be given in the General Hospital, in the Polyclinic, and in the Kaiser Franz Josef Hospital. Information regarding any of these courses can be obtained from the Kursburo of the medical faculty, 22 Schlosselgasse, Wien 8. In addition to the above an intensive course for post-graduates in neurology and psychiatry will be given beginning on January 2nd and ending on February 28th. Further information in regard to this special course can be obtained from Dr. E. Spiegel, Vienna 1 Falkestrasse 3.

NOVA SCOTIA

A fine new motor ambulance has recently been put into service by the Victoria General Hospital, Halifax.

Dr. John K. McLeod, City Health Officer of Sydney, has recently returned from a first hand study of the health departments of several of the cities of Canada and the United States.

Dr. A. C. Jost, Provincial Health Officer, returned late in October from attendance at meetings of the Dominion Council of Health at Ottawa and of the American Public Health Association at Cincinnati.

Word has been received at Halifax that Professor D. Fraser-Harris, formerly of the Dalhousie Medical School, has been appointed to the staff of the Messrs. Newnes, in connection with a new Journal which that firm is about to initiate.

Dr. Norman N. MacNeil, of Philadedphia, recently spent several weeks visiting his old home in Nova Scotia. Dr. MacNeil, who is an alumnus of St. Francis Xavier, has been appointed assistant clinical professor of pædiatrics at Jefferson Medical College.

The Halifax branch of the Registered Nurses Association of Nova Scotia, at a recent meeting, decided to endow a bed at the Halifax Children's Hospital in recognition of the fiftieth anniversary of the graduation of Dr. John Stewart. An engraved plate, indicating the purpose of the endowment, will be placed on the wall near the head of the cot.

A very encouraging report relative to the Pictou Memorial Hospital was presented at the Annual Meeting on November 9th. This institution, which has been doing excellent work for several years despite the handicap of a small and poorly planned building, is now looking forward to the completion of a new building which was commenced some months ago For two successive years the income has been well in excess of expenditure. Last year there was not a single death in the surgical wards of the hospital.

The graduating exercises of the training school for nurses of the Yarmouth hospital was held on October 20th, when the diploma of the school was awarded to several young ladies. Among those who took part in the proceedings was Mr. Kenney, superintendent of the Victoria General Hospital, Halifax, whose address was replete with appropriate references to the history of hospital development in its relationship to the training of nurses, and gave due credit to the part of the nurse in every hospital scheme.

On October 25th, the graduating class of the Nova Scotia Hospital were presented with their diplomas with due ceremony. The exercises were presided over by the Hon. J. F. Cahan, whose war wounds had required much hospitalization and who was consequently able to speak of the nurses' ministrations with the authority of experience. The address to the graduates by Dr. George H. Murphy, characterized by the good sense and gracefulness of expression which are always expected of him, dealt with the type of service rendered by the nurse and the opportunities presented to her for the exercise of gentleness and humanity.

At the annual meeting of the Halifax Children's Hospital, held on November 8th, the busiest year in the history of the institution was reported. In respect of hospital days, the previously high record (of the preceding year) was exceeded by more than 12 per cent. Dr. M. J. Carney, speaking for the medical staff, reported that 673 patients had been admitted, of whom 534 had come in for surgical treatment. The operations numbered 568. Tribute was paid to the work of Miss Carson, who had just completed the first year of her superintendency. Mr. O. E. Smith, the president of the board of management, spoke of the urgent need for enlargement of the hospital, and asked for $120,000 for the purpose. A number of prominent citizens made appreciative reference to the excellent work being done at the hospital. Mr. Smith was re-elected to the presidency of the board of management.

W. H. HATTIE

NEW BRUNSWICK

The hospitals in Moncton City received a donation of $25,000.00 voted by the management of the Canadian National Railways on November 6th. $20,000.00 goes to the city hospital and $5,000.00 is to be devoted to equipment in the new Hotel Dieu Hospital. This grant is well deserved as there are 3,500 Canadian National Railway employees resident in Moncton City.

Lieut-Col. G. G. Corbet of St. John was presented last month with the Colonial Auxiliary Forces Officer's Decoration for twenty years' service in militia. Dr. Corbet's association with the militia in New Brunswick and with the Canadian Expeditionary Force overseas has been a fine expression of his sense of duty to his country in peace and war time.

Dr. W. D. Rankin of Woodstock has presented to the University of New Brunswick, a memorial window in memory of his son Flight Lieut. Franklin Sharp Rankin who was killed overseas and his daughter Marjorie. This window will be placed in the Memorial Hall University.

The extra-mural meetings in New Brunswick for October were addressed by Dr. H. I. Kinsey of Toronto, whose subject was, "Chest diseases in children," and Dr. W. F. Roberts of St. John who spoke on "Physiotherapy." This is the first time that a local man has taken part in these extra-mural lectures and the experiment was so successful that it will be followed by the presence of further local speakers on the programme. The lecturers last month spoke at Woodstock, Fredericton, St. John, Moncton and Campbellton. Dr. Kinsey saw several clinical cases in each centre and his advice was greatly appreciated by the gentlemen privileged to consult with him.

Dr. C. L. Emerson of St. John is at present in New York following post-graduate studies in surgery.

Dr. John R. Nugent, representing the New Brunswick Medical Association was in attendance at the conference held in Charlottetown to aid in the preparation of programmes and arrangements for the Canadian Medical Association next summer.

On the morning of November 14th, a fire occurred in the Jordan Memorial Sanitarium which for a time was quite threatening but the prompt action of the hospital fire-fighting force prevented, what might have been, a serious condition. At no time was there any panic among the patients and the hospital is to be congratulated on its good discipline and good fortune.

Dr. Perry Knox of the staff of the St. John County Hospital, has returned from his short intensive post-graduate course in orthopædics at Montreal.

Dr. O. B. Evans of the surgical out-door staff of the General Public Hospital, St. John, has returned to duty after a trip to the New England States.

Dr. G. A. R. Addy and Dr. W. E. Rowley of St. John, represented the New Brunswick Council of Physicians and Surgeons at the meeting in Montreal, to discuss the arrangements for the holding of the primary examinations for the Fellowship in the Royal College of Surgeons.

Dr. Felix Dumont of Petit Rocher is spending a year at the New York Post-Graduate School, taking special work in nose and throat conditions. His brother, Dr. George Dumont of Campbellton, is also at the post-graduate school, taking further studies in surgery.

A. STANLEY KIRKLAND

QUEBEC

The new building of the Women's General Hospital was opened last month by the Mayor of Westmount. The hospital is fully equipped with all modern hospital equipment. Special provision has been made for the convenience of the nurses, and no cost has been spared in providing for the comfort of the patients. The cost of construction is stated to be $3,000 per bed. The hospital has five stories and high basement. The roof is so constructed that 30 patients may be taken on it at a time. There are three operating rooms and two rooms equipped with modern sterilizing apparatus and suitable for birth rooms. There is a fully equipped laboratory and an x-ray department has been provided. The entire hospital is heated with forced hot water system which can be regulated automatically according to the temperature required. A nurses' training school with a capacity for 35 nurses has been included.

In his report to the Auxiliary Board of Governors Dr. W. W. Chipman stated that 2,222 babies were born during the last year under the care of the Royal Victoria Maternity Hospital. Of these, 1,873 were born in the house and 349 in the outdoor service. He characterized the year as one of great service. He sympathized with the natural preference of a mother to have her child born in her own home, but maintained that it was undoubtedly much better for mother and child that the baby and especially the first baby, should be born in hospital. "Motherhood is an untried journey" he pointed out. You cannot prophesy about it. The financial report showed receipts of $9,923.30 and expenditures of $6,575.18, leaving a balance of $3,348.12. The adoption of all the reports was moved by Sir Andrew Macphail, who spoke highly of the financial condition of the organization. Sir Vincent Meredith, president, and Lady Meredith, president of the auxiliary board, both expressed their admiration for the work that had been accomplished.

The new pathological museum in the Pathological Institute has been opened for the first time since the construction of the institute. The museum specimens record the history of pathological research at McGill. It is expected that there will be some 4,000 specimens in the museum when they have all been placed including some 1,500 which have been added since the pathological exhibits were removed from the medical museum to the Pathological Institute. The material is being arranged by organs and not by diseases and the museum will act as a depository for medical research.

GEORGE HALL

A

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ONTARIO

UNIVERSITY OF WESTERN ONTARIO

The committee in charge of the post-graduate course given at the university on September 14th and 15th is enthusiastic over the success of the experiment, and recommends that it be repeated next year.

Mr. Gordon Craig, of Sydney, Australia, addressed the Western Ontario Academy of Medicine on October 10th on "Some aspects of hydatid disease." The speaker dwelt on the practical phases of the subject including its clinical manifestations, diagnosis, and treatment. In the discussion which followed, Dr. Hadley Williams, Dr. G. C. Hale and Dr. J. T. Bowman took part.

A recent addition has been made to the diagnostic equipment of the Victoria Hospital in the form of a portable x-ray apparatus by which examinations can be made in the ward without disturbing the patient.

Portrait of Dr. Waugh.—At the October meeting of the Executive Committee of the Alumni Association, it was decided to secure an oil painting of Dr. Wm. Waugh, Bursar of the University and formerly Professor of Surgery. Dr. Waugh and Professor J. H. Bowman are the only two left of the original Faculty who lectured during Western's first session (1882-1883) in the little brick cottage at the corner of Hellmuth Avenue and St. James Street. Groups of graduates from all over the continent have been urging that portraits of "the Old Faculty" be secured. The Ottawa, Toronto, Essex County and Detroit graduates suggested that Dr. Waugh should be the first of the series. Dr. J. A. Macgregor '92 was chosen chairman of the Portrait Fund. The personnel of the Committee will be announced later.

New Operating Suite at Victoria Hospital.—A new and modern operating suite is now in use at Victoria Hospital. This recent addition to the institution is a result of the generosity of Colonel Wm. M. Gartshore. The suite, which was equipped at a cost of $56,000 is situated on the second floor of what was the original hospital building, constructed in 1875. It consists of two large rooms, with a northern aspect, fitted for general surgery and three rooms on the south side of the main corridor for eye, ear, nose and throat operations. Those who attended clinics in the old operating room may be interested to know that the new rooms are provided with up-to-date portable galleries attainable through a special student's entrance and dressing room. Mrs. Jeffries donated the sum of $6,000 to be used for the purchase of equipment to perpetuate the memory of her son, Dr. E. F. Jeffries '09, who was an interne at Victoria Hospital. Therefore one of the main operating rooms is designated the "Jeffries room" and the other the "Lister room" to commemorate the great surgeon whose centenary was observed this year. As a permanent expression of gratitude to Colonel Gartshore for his kindly interest in the hospital, a tablet has been erected by the practitioners of London.

Essex County Alumni Meeting.—The October meeting was held at the Mandarin Gardens, Windsor, with Dr. W. C. Doyle, President of the Association in the chair. Dr. Grant Duffin reported a case of gas gangrene which complicated a compound fracture of the forearm. The rapidity of the gangrenous invasion was most phenomenal. In forty-five minutes before amputation at the shoulder, which was necessary to save the boy's life, the gangrene travelled two inches. He made an excellent recovery.

Dr. Royden E. Holmes spoke on the value of x-rays as a therapeutic agent. He gave a very lucid description of their chemical and biological action on embryonic tissues.

Dr. Murray S. Douglas outlined the history of a case of marked secondary anæmia and reviewed the literature on the subject.

Medical supervision of the school children of Windsor was shown by Dr. L. J. A. Hyttenrauch, the School Medical Officer for Windsor, to be largely a matter of educating the child in health habits. Examinations were made of those taking part in athletics.

Dr. Marsh W. Poole read a paper on the "Indications and Value of Blood Transfusion" and also discussed the popular topic of deciding parentage by the study of the blood.

The subject of goitre was dealt with by the President, Dr. W. C. Doyle, who has had an extensive clinical and operative experience with this disease. The extensive bibliography on thyroid diseases was summarized in a very lucid manner.

The enrolment at the University of Western Ontario Medical School for the session of 1927-28 is 134, the largest in the history of the institution. This figure does not include those registered in the first two years of the six year course.

The announcement is made in the public press that Dr. G. H. Stevenson, Assistant Superintendent of the Ontario Hospital for the Insane has been appointed to the position of Superintendent of the Ontario Hospital for the Insane at Whitby.

Dr. Stevenson is a native of Hamilton, Ont., and a graduate of Toronto University. He enlisted for service in the great war in the 34th Battalion, but was later on transferred to No. 3 Canadian Stationary Hospital and was with the latter unit at the Dardanelles and in Egypt. He joined the staff of the Ontario Hospital, London, in 1920, and was subsequently appointed Associate Professor of Psychiatry at the University of Western Ontario Medical School. He has been keenly interested in the proposed establishment of an out-patient clinic for mental cases in connection with the Victoria Hospital, London, a project that will now have to get along without his energetic and enthusiastic assistance.

J. W. CRANE

MANITOBA

Dr. D. A. Stewart recently addressed the North Dakota Educational Convention at Bismark, taking as his subject "Health and the School."

Dr. G. S. Fahrni and Dr. W. L. Mann attended the Tri-State Medical Convention at Kansas City.

At 11 a.m. on November 11th, a brief Armistice Memorial service was held at the Medical College under the auspices of the Manitoba Medical Alumni Association. Dr. B. J. Brandon presided and Major (Dr.) N. K. McIvor gave an eloquent address.

The balconies on the third and fourth floors on the west side of the Winnipeg General Hospital are being altered so as to create two new wards for surgical tuberculosis. This will provide sixteen additional beds.

Dr. Brodie has begun practice in Winnipeg and

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THE PHARMACOLOGY OF COD LIVER OIL

Much research work has been done in recent years with cod liver oil, but its significance has perhaps been underestimated because of the difficulty of co-ordinating the various conclusions. This difficulty has been aggravated by reason of the mass of the literature reporting it, and the widely different sources from which it has appeared. These facts have made it well-nigh impossible for anyone, other than the specialist investigating the properties of cod liver oil, to familiarize himself with the present knowledge concerning it.

Cod liver oil was introduced into the Materia Medica of England as early as 1771 for the treatment of rickets, rheumatism and sciatica, but it is only within the last decade and a half that the real reasons for its efficacy have been understood. The discovery of vitamins and the fact that at least two of them are potently present in cod liver oil gave impetus to the investigations. Finally, increasing knowledge of the control exercised by the oil over the metabolism of calcium and of phosphorus in the body added the force of scientific reason to what have formerly been only an empiric use.

Recently, however, the literature on the subject has been carefully surveyed and the findings correlated and summarized in an interesting little brochure, intended for the busy physician, entitled "The Pharmacology of Cod Liver Oil". A significant bibliography is appended. The work has been done by a reputable scientist and is published by the Research Laboratories of Smith, Kline & French Company, Philadelphia. Copies may be had upon request to the publisher.

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XUM

has been appointed to the medical staff of St. Boniface Hospital.

Dr. T. H. Cuddy has opened an office at 911 Boyd Building, Winnipeg, and will devote himself to diagnosis and treatment of gastro-intestinal diseases.

Dr. Moore McFetridge has taken over the practice of Dr. S. A. McKeague of Winnipeg.

Dr. John McEachern, formerly assistant in pathology to Dr. Wm. Boyd of the Winnipeg General Hospital, and later pathologist to the Milwaukee County Hospital has returned to Winnipeg where he will practise internal medicine. He has received an appointment on the staff of St. Boniface Hospital.

Dr. Alex. J. Swan has recently returned from Scotland and the continent and has opened an office in the Medical Arts Building, Winnipeg, where he will devote himself to ophthalmology and oto-laryngology.

Dr. D. S. McKay and Dr. Arthur Burridge made a tour of Alberta under the extra-mural post-graduate scheme of the Canadian Medical Association, and at the same time Dr. F. D. McKenty and Dr. E. J. Boardman made a similar tour of Saskatchewan.

A special Osler night was given by the Osler Society of Winnipeg at the Medical College on November 29th.

ROSS MITCHELL

SASKATCHEWAN

At the annual meeting of the Regina District Medical Society, held October 6th, the following officers were elected: Hon. President, Dr. F. W. Hart, Indian Head. President, Dr. H. H. Mitchell, First Vice-President, Dr. R. O. Davison, Second Vice-President, Dr. W. A. Dakin, Secretary, Dr. P. L. Straith, Treasurer, Dr. S. E. Moore, Regina.

At the regular meeting, November 2nd, Dr. C. M. Henry gave a very comprehensive paper on "Colonic Stasis," and Dr. S. E. Moore a short address on "Present Day Relationship between the Medical Men and the Public."

At the annual meeting of the Saskatoon District Medical Society the following officers were elected: Hon. President, Dr. E. E. Shepley, President, Dr. H. C. Boughton, First Vice-President Dr. A. L. Anderson, Secretary-Treasurer, Dr. Wm. Oliver, Saskatoon.

Under the extra-mural post-graduate scheme, Dr. F. D. McKenty and Dr. E. J. Boardman, of Winnipeg, addressed the District Societies at Yorkton, Saskatoon, Prince Albert, North Battleford, Regina, Moose Jaw, Weyburn, and Swift Current. Dr. McKenty's subjects were, "The Significance of Nasal Suppuration" and "Some Indications for Tonsillectomy". Dr. Boardman spoke on "Ureteral Calculus." In spite of the severity of the weather the meetings were well attended and the addresses delivered were of a very high order and were greatly appreciated by those present.

Dr. Scott, Professor of Physiology at the University of Saskatchewan, has just returned after an extended holiday in the United States and Europe. While absent he attended several clinics and had the pleasure of meeting a large number of the most prominent men doing research work in physiology, both in the United States and Europe.

Dr. Norman Bellas, who practised at Prince Albert for the last four months, has moved his office to Saskatoon.

Dr. E. L. Moyer, who for some time practised at Moose Jaw, has opened up an office at Meyronne.

Dr. J. T. McKay, who for several years practised at Saskatoon, and later moved to Oregon, U.S.A., where he practised for some years, has returned to Saskatoon and resumed practice.

Dr. A. W. Brodie, of Blaine Lake, is taking post-graduate work in Great Britain. On his return it is his intention to reside in Prince Albert.

An election was recently held for the Council of the College of Physicians and Surgeons of Saskatchewan, and the following members were elected for a period of three years: Dr. R. L. King, Prince Albert, Dr. E. R. Myers, Saskatoon, Dr. J. F. Irving, Yorkton, Dr. B. M. Bayly, Moose Jaw, Dr. O. E. Rothwell, Regina, Dr. H. E. Eaglesham, Weyburn, Dr. A. W. Argue, Grenfell.

BRITISH COLUMBIA

The first meeting of the winter session of the Vancouver Medical Association was held on Tuesday, October 4th. In the absence of Dr. A. B. Schinbein, Dr. W. S. Turnbull, Vice-President, took the chair. On motion of Dr. F. P. Patterson, seconded by Dr. A. W. Hunter, a standing vote of sympathy with Mrs. B. H. Champion in the recent loss of her husband was carried. At this meeting permission was given for the formation of a pædiatric section of the Vancouver Medical Association. Dr. E. Murray Blair gave an excellent paper outlining a conservative treatment for chronic endocervicitis by means of a hygroscopic powder supplemented by the electric cautery, which in his hands has given excellent results and obviated the necessity for amputation in many cases. Dr. D. E. Cleveland read a paper on the recognition of syphilis, which will appear in the December issue of the *Vancouver Medical Association Bulletin*.

The October clinical meeting of the Vancouver Medical Association was held in the board room of the Vancouver General Hospital, October 18th. Fifty members attended. Cases were shown by Dr. W. D. Kennedy, Dr. W. D. Patton, Dr. Howard Spohn and Dr. Lachlan Macmillan.

Dr. A. B. Schinbein delivered his address as President of the Vancouver Medical Association on November 1st. This address dealt more particularly with the internal organization and affairs of the Association, and touched on the desirability and urgency of providing a headquarters worthy of the dignity of the profession which should also house the library which at present was working at a disadvantage owing to lack of space.

A Standing Committee was formed to be called the Committee on Hospitals. The duties of this Committee were defined as being (1) to enable the Association to take a lead in the development of the hospital situation in Greater Vancouver; (2) to promote hospital efficiency

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and (3) to take care of the members' interests in all matters relating to hospitals.

The regular monthly meeting of the Fraser Valley Medical Society was held at the Royal Columbian Hospital on Tuesday evening, October 4th, at which Dr. J. J. Mason of Vancouver gave an address on the subject of "ectopic gestation," in which special emphasis was laid on the importance of differential diagnosis and the value of close history taking as well as auto-transfusion and prompt surgical treatment.

Dr. A. G. Elvin, late of Ladner, B.C., left on October 27th for White Horse, Yukon, where he will act as *locum tenens* for Dr. N. E. Culbertson for one year. Dr. Culbertson has left for the east to take post-graduate work.

Dr. F. C. Dunlop has returned to the city after eight months' absence. The doctor visited New York, Philadelphia, and paid a visit to the Old Country, doing special work in obstetrics and gynæcology in various medical centres. He has now resumed practice.

Dr. H. R. Mustard, who was for some years on the Pensions Board has arrived in Vancouver and taken offices in the Birks Building. Dr. Mustard has recently spent some time in post-graduate study in New York, and will specialize in eye, ear, nose and throat work.

Dr. R. B. Brummit of Vancouver, has been appointed Medical Officer at Terrace, B.C.

Dr. H. C. McKenzie is now engaged in practice at William's Lake, B.C.

J. EWART CAMPBELL

Book Reviews

Conditioned Reflexes. An Investigation of the Physiological Activity of the Cerebral Cortex. L. P. Pavlov. Translated by G. V. Anrep, M.D., D.Sc. 430 pages, illustrated. Price $8.50. Oxford University Press, Toronto, 1927.

In undertaking the translation and editing of these twenty-three lectures of his teacher, Dr. Anrep took unto himself what must have been a very heavy task. He has done the work well and Anglo-Saxon students will be deeply grateful to him, not only for an excellent translation, but for certain alterations in terminology and some expansion of the text to render it more lucid, the latter done, of course, with the author's sanction.

The twenty-three lectures in the volume represent the personal work of Pavlov and his assistants over a period of twenty-five years. The appended bibliography, divided appropriately into sections each dealing with some particular aspect of the subject, consists entirely of publications from Pavlov's own laboratory—not an objectionable thing, since few would deny that these publications contain, in all likelihood, the really valuable contributions to the subject.

Space does not permit of a detailed review of the book. The author contrasts the tremendous importance of the cerebral cortex and the meagreness of the knowledge of its activities, a condition of affairs due, he thinks, to the fact that investigators have been scared off by the concept of special psychological activity in the cortex. The result has been that the subject has fallen between the stools of physiology and psychology and has been neglected by both. The statement of frank doubt as to psychology being a science at all is somewhat softened by indications that the most recent psychological authorities of which he has detailed knowledge are James and Wundt. The psychological aspects of his own work will afford great comfort and support to the Behaviourists. One notes throughout his determination to adhere as nearly as possible to the objective method—a standpoint always desirable, but not always possible.

As a preliminary, the author presents an interesting general discussion of reflexes and instincts. Of the former, which he looks upon as always protective or preservatory in purpose, we really know remarkably little beyond the bare fact of existence. The nervous mechanisms involved, particularly those relating to inhibition, are little known. He accepts the Spencerian view of instincts as inborn reflexes, and cites imposing arguments in favour of such a viewpoint. In passing, one might express a doubt as to the validity of his newly-described "freedom reflex." One suspects that most psychologists would think of the curiosity or investigatory instinct as an explanation of the phenomena described in this connection.

He feels that neither reflexes nor instincts are sufficient to meet the complex conditions of every day existence and has spent his life time in establishing the existence of, and elucidating the mechanism of, the necessary third type of vital activity—the conditioned reflex. His own work, and that of the dozens of others stimulated by him, go a long way to establishing the case.

The book may be divided roughly into three sections. Of these, the first, comprising lectures 1-16, presents the physiological aspects of the subject and is complete with full descriptions of technique, experiments, and deductions. Lectures 17-21 set forth the modifications in the previously described results that may be expected under artificially produced pathological conditions. Lecture 22 is a precautionary chapter inserted, no doubt, to quell the exuberant enthusiasm of those who rush into generalization with insufficient evidence at hand. Lecture 23 is a very careful and conservative statement of the application of the findings to man. In each lecture the excellent plan is followed of presenting first the experimental data; second, the explanation and argument; and finally a concise, one-paragraph summary.

The book is a monument to the extraordinary powers of observation, patience and dialectic capacity of Dr. Pavlov and his associates. He is a real investigator and a splendid teacher to whom physiology, psychology, and medicine are deeply indebted; an artist quickening a wonderful world by "throwing open the door to a true physiological investigation of all the highest nervous activities."

A. T. MATHERS

The Blood Vessels of the Human Skin and Their Responses. Thomas Lewis, M.D., F.R.S. 326 pages, 76 figures. 37/6 net. London: Shaw & Sons, Ltd., 1927.

There is probably no subject which seems more easy of approach than the physiology of the cutaneous vessels, and yet it is only recently that we have arrived at even partial solutions of the problems they present. Much of the ground was cleared by the work summarized in Krogh's Silliman lectures on the anatomy and physiology of the capillaries. Dr. Lewis' book contains both a confirmation of that work, and a contribution of fresh knowledge to the subject.

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it contains observations carried out entirely on human beings. It therefore has, to quote Professor H. H. Dale, "the invaluable quality, the peculiar interest and authority of a personal document." Those who have interested themselves in the reactions of the minute blood vessels will immediately appreciate the value of the conclusions arrived at by Sir Thomas Lewis. They cannot fail also to be impressed by the simplicity of the methods by which he has reached his conclusions. The only special instrument required is an armlet for shutting off the circulation to the limb. With this, a needle, and a flat ruler one may go far in following the train of events which he has traced for us.

Who before has taken the apparently simple phenomenon of reddening of the skin under stroking, and analyzed it to show that there is behind the obvious dilatation of the vessels an orderly process depending on the local liberation from the injured epidermal cells of a definite chemical substance? What this substance is has yet to be proved. Sir Thomas is content, after pointing out how exactly its action corresponds to that of histamine, to call it only the "H-substance." It is no new idea that injured cells give rise to a substance which acts in the same way as histamine. We recognize its action in the conditions met with in shock from crushed or torn limbs. But, to apply this conception to such mild reactions as result from stroking the skin, and to show by careful reasoning that these are actually the early stages of the more serious conditions, has not been done before, certainly not with such a wealth of illustration and precise and convincing evidence.

It is shown that the tissue-elements which contain this "H-substance", and so are responsible for the vascular reactions of the skin, are the living epidermal cells: for the following reasons. The short time required for a response to a stimulus points to the likelihood of the nearest cells to the vessels being responsible: no reactions follow cuts or punctures in the horny layer alone: reaction always follows as soon as pain is evoked, indicating that the living epidermis has been reached; and, under the binocular microscope a fine needle may be passed in until it is seen to lie just above the capillary loops, that is, above the dermis, when reaction will occur. It is not the endothelial cells of the vessels that release the substance, for freezing of the skin to the extent of causing whealing (evidence of vascular reaction) leaves no ultimate damage in the capillaries, whilst desquamations show that the epidermis *has* been affected.

This is a small example to choose from a great volume of evidence, but it is not easy to properly extract where the argument is so closely knit.

The monograph contains work which has been in progress for eleven years, and has been published in the journals at irregular intervals. Sir Thomas wished however to stimulate still further the study of human physiology, and the collection of his scattered work into this volume is the result. Whether he attains his latter object will depend on the reader's appreciation of what is the highest form of physiological inquiry, of rigid scrutiny of observations and refusal to draw conclusions from insufficient evidence. At the same time, he has succeeded in making clinical applications grow from his physiological inquiries as naturally as it is desired by intelligent clinicians that they should.

H. E. MACDERMOT

Practical Bacteriology, Blood Work, Parasitology. E. R. Stitt, A.B., Ph.G., M.D., Sc.D., LL.D., Rear Admiral, Medical Corps, and Surgeon General, U.S. Navy. Eighth edition, 1927. 1 plate and 683 figures. P. Blakiston's Son & Co., Philadelphia. $6.00.

That this book has reached its eighth edition is proof of its excellence, and that it meets satisfactorily the proverbial "long-felt want." The author has attempted, by altering the format, to reduce the size of the volume, but the advances in laboratory technique have required the addition of some new material. Consequently, the size remains much as it was in the last edition. The book is not, however, in our judgement, too large. In dealing with the bacteria, both the old and the new nomenclatures are employed. A useful feature is provided in the "Keys" which introduce the various chapters dealing with bacterial groups whereby one can easily and rapidly get acquainted with the chief diagnostic points. It is interesting to learn that the Kahn precipitation test has replaced the Wassermann as the standard procedure in the United States Navy Medical Service, and that Dr. Stitt regards it as the test of election. Bacteriological technique is given sufficiently fully: the chief pathogenic micro-organisms are described: and there is a useful chapter on the bacteriology of water, air, and milk. The chapters dealing with the study of the blood have been much improved and some of the later methods of examination have been introduced. An entirely new section on the tests for liver function has been added.

The book has a wider scope than the majority of books prepared for laboratory workers, dealing as it does with animal parasites, poisonous animals, disinfectants and disinfestants: anatomical and pathological normals: and nutrition in health and disease. Valuable instruction is given on the matter of preparing normal solutions, and on the complicated subject of hydrogen-ions.

The book has so many good features of its own that it can be cordially recommended.

A. G. NICHOLLS

Bronchoscopy and Esophagoscopy. Chevalier Jackson, M.D., Sc.D., LL.D., F.A.C.S. Second edition. 457 pages, 179 illustrations. Price $8.00. Philadelphia and London, W. B. Saunders Co.; Canadian Agents, McAinsh & Co., Toronto, 1927.

This second edition of a very well known work has been long overdue, and will be eagerly welcomed. It is an epitome of the ripe experience of the author and his associates compressed into 419 pages of clear and concise text, printed plainly on excellent paper and generously illustrated.

Professor Jackson has seen the science of endoscopy grow, in no small degree from his own efforts, until it now stands with roentgenology itself as an indispensable diagnostic method; and in addition it has become an invaluable means of therapy, not only in the removal of foreign bodies from the larynx, bronchial tree and œsophagus, but in the local treatment of tumours, ulcers, and other lesions of these tracts, including even abscess of the lung. It is of use, too, in opening up stenosed bronchi and in roentgen-ray localization, and not a few useful anatomical and physiological facts have been brought to light through its aid.

There is a rare individuality, a strong independence, a sureness in this treatise which commands attention and inspires confidence, for he is known all over this continent and abroad for his researches, publications, and clinics, and has long occupied a position of the highest eminence in the eyes of the profession; indeed his accomplishments, and the well merited honours which he has won, are too familiar to require recital here. He is a unique worker and teacher. Those who, like the reviewer, have been privileged to witness his marvellous skill in the removal of foreign bodies from the bronchi, and in other operations, know how meticulous he is in every detail of his work, and how with him the operations are so thoroughly standardized that their probable duration in seconds can be quite accurately predicted.

Here we read of the latest findings in the anatomy and physiology of the bronchial tree, including the

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most recent views on bronchial movements. Here we see a full description of the various instruments used in the field of endoscopy, many of which have been invented by the author himself, and his associates. These include not only specially designed specula, such as the bronchoscope, of which there are a host of modifications, but also an almost infinite variety of ingenious forceps for the removal of every conceivable type of foreign body, not a few of which demand highly specialized mechanical devices for their safe extraction, such as "mushroom anchor" upholstery tacks, staples, and open safety pins. Foreign bodies lodged in the upper lobe bronchi may now be pulled out. The feats which are regularly performed in modern bronchoscopic clinics would have seemed incredible a few years ago.

Full directions for the preparation of the patient, induction of anæsthesia, the introduction of the instruments and their manipulation in the various extractions and other operations are given. The dangers of bronchoscopy are pointed out, with ways and means of avoiding these. The necessity for preparatory drill on the cadaver, mannikin, and dog is stressed, to the end that the essential "nerve cell habit" be acquired. Professor Jackson is rightly insistent upon perfect team-work:

> "It ain't the individual
> Nor the army as a whole,
> But the everlastin' team-work
> Of every bloomin' soul."

sings Kipling, and it is as important in the operating room as in the army.

There are several chapters on the œsophagus and its uses, and peroral gastroscopy is not neglected. There is a full bibliography, and a very useful index.

C. C. MACKLIN

Researches in Polynesia and Melanesia. An account of investigations in Samoa, Tonga, the Ellice Group and the New Hebrides in 1924, 1925. Parts I-IV (Relating principally to Medical Entomology). Patrick A. Buxton, M.R.C.S., D.T.M. & H. Formerly Milner Research Fellow: Director, Department of Medical Entomology, London School of Hygiene and Tropical Medicine, assisted by G. H. E. Hopkins, M.A., F.E.S. 256 pages, with plates. Price 10/6. The London School of Hygiene and Tropical Medicine, London, England, 1927.

This volume appears as No. 1 of the Memoir Series of the London School of Hygiene and Tropical Medicine. It deals with the medical entomology of the areas investigated and with the climatology of Samoa. The expedition was sent by the London School with the New Zealand Government in the study of filariasis. The Apia Hospital formed the base of operations. Samoa is a group of islands some 500 miles north east of Fiji. Formerly a German colony, the western part is now administered by New Zealand under mandate from the League of Nations. The remaining islands belong to the United States. The first part of the report describes the islands with their geography, flora and fauna, the second part is devoted to climatology, the third part to medical entomology and the fourth to experimental work with two species of Eedes (stegomyia), *a. argenteus* and *a. variegatus.*

A. argenteus formerly known as *stegomyia fasciata* has a wide world distribution. Here, like culex fatigans, it is a recent immigrant found round European settlements, and is not yet a wild species breeding in holes in trees as is its natural haunt in its West African home.

One hundred pages record the experimental work with the eggs, larvæ, pupæ and egg-laying and hatching of these two species.

In an attempt to estimate the prevalence of malaria in the New Hebrides, the spleen examination of 280 children showed 29 per cent positive, while blood examination gave 18 per cent with parasites. No parasites of quartan malaria were found.

The filariasis of the New Hebrides is nocturnal. Of 318 male natives over 12 years of age, 100 showed larvæ in blood serum, 53 had a palpable epitrochlear gland, 23 had hydrocele, and 19 elephantiasis. Elephantiasis is rare in the European population.

Fully detailed reports are promised dealing with filariasis in the New Hebrides and Samoa, and these we shall await with interest. Dr. Buxton and Mr. Hopkins are to be congratulated upon the excellence of the first part of their report.

J. H. ELLIOTT

Blood Pressure. Its Clinical Application. George William Norris, A.B., M.D., Henry Cuthbert Bazett, M.B., and Thomas M. McMillan, A. B., M.D. Fourth edition. 387 pages, 47 engravings. Price $4.50. Lea & Febiger, Philadelphia, 1927.

The fourth edition of this book is a most complete review of the subject of blood pressure and its relation to clinical medicine. The first half deals with the physiology and instrumental estimation of blood pressure and the normal and abnormal values, while the second deals with hypertension in disease and its treatment. The bibliography is extensive and up-to-date, with references appearing on each page as a foot-note. The part which deals with the physiology of blood pressure is easily read. The attitude in regard to the various methods of blood pressure determinations is well taken. Two chapters are devoted to the general and medicinal treatment of hypertension, with the proper amount of enthusiasm accorded to the more recent experimentation. In brief, it is a book which should prove interesting and instructive to everyone who uses a sphygmomanometer.

KEITH GORDON

Diseases of Infants and Children. J. P. Crozer Griffith, M.D., Ph.D., Professor of Pædiatrics in the Graduate School of Medicine of the University of Pennsylvania and A. Graeme Mitchell, M.D., B. K. Rachford, Professor of Pædiatrics, College of Medicine, University of Cincinnati. New 2nd Edition. Vol. i, 788 pages, illustrated. Vol. ii, 927 pages, illustrated. Per set $22.00. London and Philadelphia: W. B. Saunders, Company, Toronto: McAinsh & Co., Limited, 1927.

This, the second edition of this work on "Diseases of Infants and Children" has been re-written and brought up to date by Dr. Crozer Griffith, in association with his friend Dr. B. K. Rachford and his one time associate, Graeme Mitchell of the University of Cincinnati. More and better temperature charts and illustrations have been used, and, as in the earlier edition, their value has been greatly enhanced by the brief resumé given of the cases from which they were obtained.

The authors make no claim to having produced an encyclopædia of pædiatrics. They have however, covered this field of medicine with thoroughness and a much greater than usual recognition of the contributions made by modern research to the elucidation of its problems, and have thus created a book valuable alike to both specialist and student. The excellent bibliography, appended to the discussion of each topic, together with the system of cross references used, render the acquirement of a full knowledge of any subject possible to the reader with a minimal amount of effort on his part.

The confusion so often arising from the exclusive use of either the English or metric system has been avoided by giving all measurements in both. The only exception is that in the discussion of infant feeding, only the English system is given, as practically all utensils used in the preparation of the infant's food are marked in this system.

GLADYS BOYD

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